

## CHAPTER-VII : ORDNANCE FACTORY ORGANISATION

### 7.1 Performance of Ordnance Factory Board

#### 7.1.1 Introduction

**7.1.1.1** Ordnance Factories are the oldest and largest organization in India's defence industry with a history that dates back to 1787 when a gun factory was established at Ishapore which started production in 1791. There are 41 Factories (including two Factories at Nalanda and Korwa which are at project stage) divided under five clusters or operating groups (**Table 25**) producing a range of arms, ammunition, weapons, armoured and infantry combat vehicles, and clothing items including parachutes for the defence services. They function under the Ordnance Factory Board (OFB) which is under the administrative control of the Department of Defence Production of the Ministry of Defence, Government of India.

Operating group	Number of factories
<b>Ammunition &amp; Explosives</b>	11
<b>Weapons, vehicles and equipment</b>	11
<b>Materials &amp; Components</b>	8
<b>Armoured vehicles</b>	6
<b>Ordnance equipment group</b>	5
<b>Total</b>	41
<i>Source: Annual Accounts of Ordnance Factories-2015-16</i>	

**7.1.1.2** The major objectives of the Board are:

- To supply quality arms, ammunition, tanks and equipment to armed forces;
- To modernise production facilities to improve quality;
- To equip themselves with technologies through Transfer of Technology and in-house Research & Development; and
- To meet customer satisfaction and expand consumer base.

#### **7.1.1.3 Status of Two Ordnance Factories under Project Stage**

Ordnance Factory Project Nalanda was sanctioned (November 2001) by Government of India, Ministry of Defence as a new propellant factory for manufacture of 2 lakh Bi-Modular Charge System (BMCS) *per annum* for 155mm ammunition at an initial cost of ₹941.13 crore, which was revised (February 2009) to ₹2160.51 crore. The project was due to be completed by November 2005 and the Planned Date of Completion (PDC) was later revised

to March 2019. Expenditure incurred on plant and machinery and civil works up to 31 March 2016 amounted to ₹245 crore and ₹423 crore respectively. A total of ₹668 crore has been spent for the project till 31 March 2016.

Ordnance Factory Project Korwa was sanctioned (October 2007) by the Government of India, Ministry of Defence for manufacture of 45,000 carbines *per annum* at an estimated investment of ₹408 crore. The time schedule for completion of the project, initially fixed as October 2010, was revised to March 2017. As of 31 March 2016, the Board expended ₹124 crore and ₹152 crore towards plant and machinery and civil works respectively. A total of ₹276 crore has been spent for the project till 31 March 2016.

Even after expenditure of ₹944 crore on these two projects, none of the project had accrued any benefits to the Board.

**7.1.1.4** Our analysis of the performance of the Board during 2015-16 places it, where relevant, against the above objectives.

## 7.1.2 Performance of Ordnance Factory Board

The data on key areas of management in the Board for the five years 2011-16 are summarized in **Table 26**<sup>26</sup>. **Annexure-I** gives the details segregated across operating groups.

**Table: 26**

(₹ in crore)

	Years					Variation between 2015-16 and 2014-15 (%)
	2011-12	2012-13	2013-14	2014-15	2015-16	
<b>I Financial Performance</b>						
<b>Revenue expenditure</b>						
<b>1</b> Budget Estimate (BE)	11,640	13,013	13,856	14,317	14,706	3
<b>2</b> Final Grant	12,332	11,821	12,954	13,617	14,750	8
<b>3</b> Actual Revenue expenditure (%) utilization to Final grant	12,141 (98)	11,936 (101)	12,834 (99)	12,832 (94)	14,133 (96)	10
<b>4</b> Excess(+)/Savings(-) (3)-(2)	(-) 191	(+) 115	(-) 120	(-) 785	(-) 617	21
<b>5</b> Revenue receipts <sup>27</sup>	12,876	12,553	12,001	12,001	13,712	14
<b>6</b> Cost of issues to indentors	16,147	16,181	15,783	16,380	18,457	13
<b>7</b> Value of issues to indentors	17,273	17,119	16,122	16,664	18,624	12
<b>8</b> Profit (7) - (6)	1,126	938	339	284	167	(-) 41
<b>Capital expenditure</b>						
<b>9</b> Budget Estimate	400	400	436	1,207	760	(-) 37
<b>10</b> Final Grant	293	357	466	765	687	(-) 10

<sup>26</sup> Figures in the Table have been readjusted wherever found necessary.

<sup>27</sup> Recoveries for supplies to Army, Air Force, Navy and other defence departments are shown as "deduct" under Minor Head 901 to 904 under Major Head 2079 up to 2013-14 in the Appropriation Account of the Defence Services.

		Years					Variation between 2015-16 and 2014-15 (%)
		2011-12	2012-13	2013-14	2014-15	2015-16	
<b>11</b>	Capital expenditure(Actual)	279	349	465	746	680	(-) 9
<b>12</b>	Excess (+)/Savings (-) (11)-(10)	(-) 14	(-) 8	(-) 1	(-) 19	(-) 7	63
<b>II Cost of Production: Components</b>							
<b>13</b>	Cost of stores	10,070	9,746	9,303	9,269	10,555	14
<b>14</b>	Cost of labour	1,490	1,617	1,705	1,959	2,040	4
<b>15</b>	Other costs <i>i.e.</i> Direct Expenses	159	216	239	274	298	9
<b>16</b>	Overheads	4,214	4,393	4,389	4,973	5,401	9
<b>17</b>	<b>Total Cost of Production</b>	15,933	15,972	15,636	16,475	18,294	11
<b>18</b>	Overheads as % of COP (16/17*100)	26	28	28	30	30	0
<b>19</b>	Labour costs as % of COP (14/17*100)	09	10	11	12	11	(-) 8
<b>III Inventory</b>							
<b>20</b>	Stores-in-hand	5,336	5,604	5,588	5,906	6,739	14
<b>21</b>	Work-in-progress (WIP)	2,551	2,999	3,538	3,817	4,146	9
<b>22</b>	Stores-in-transit	538	682	854	887	988	11
<b>23</b>	Finished goods/components	1,212	1,206	1,305	1,698	1,535	(-) 10
<b>24</b>	<b>Total inventory</b>	9,637	10,491	11,285	12,308	13,408	10
<b>25</b>	Inventory as % of COP	60	66	72	75	73	(-) 3
<b>26</b>	WIP as % of COP	16	19	22	23	23	0
<b>IV Labour &amp; Machines</b>							
<b>27</b>	Numbers of direct industrial employees (DIEs)	46,568	47,166	46,206	44,464	43,002	(-) 3
<b>28</b>	Ratio of DIEs : Supervisory officers	1.41:1	1.46 : 1	1.5 : 1	1.5 : 1	1.4 : 1	(-) 7
<b>29</b>	Production per employee ( ₹ in thousands )	1,674	1,682	1,680	1,821	2,059	13
<b>30</b>	Man-hour utilization (%)	127	129	127	127	127	0
<b>31</b>	Machine hours available (in lakh hours)	1,577	1,603	1,203	1,001	1,155	15
<b>32</b>	Machine hour utilization (%)	78	76	73	75	78	4
<b>V Issues: Indentor-wise</b>							
<b>33</b>	Army	10,027	9,609	8,609	9,098	10,202	12
<b>34</b>	Air Force and Navy	433	433	539	562	719	28
<b>35</b>	Other Defence Departments	192	138	147	164	221	35
<b>36</b>	Central Paramilitary Police Organizations (Ministry of Home Affairs)	826	831	782	650	571	(-) 12
<b>37</b>	Civil trade including Exports	913	963	1,046	889	1,032	16
<b>38</b>	IFD supplies <sup>28</sup>	4,883	5,145	4,999	5,301	5,879	11
<b>39</b>	<b>Total issues</b>	17,274	17,119	16,122	16,664	18,624	12
<b>VI Research &amp; Development</b>							
<b>40</b>	Expenditure on R&D	36	48	43	56	88	57
<b>41</b>	R&D expenditure as % of total revenue expenditure	0.30	0.40	0.34	0.44	0.62	41

Source : Budget & Expenditure Statement of OFB and Annual Accounts of Ordnance Factories

Our analysis of trends from the data in **Table 26** is discussed in the succeeding paragraphs.

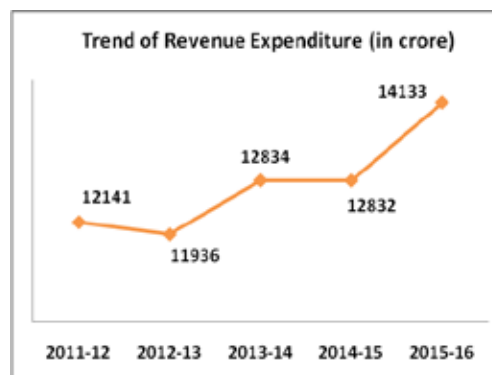
<sup>28</sup> IFD: Inter Factory Demand, whereby sister factories feed the need for stores of other factories.

## Budgeting

### 7.1.2.1 Revenue expenditure

The Ordnance Factory Board (Board) receives budgetary grant under Grant No 26 of the Ministry of Defence to meet its running expenses *i.e.*, the revenue expenditure. The total grant was ₹14,750 crore in 2015-16. The Major Head 2079-Defence Services-Ordnance Factories is operated for booking its expenses and its recoveries against issues to the Defence establishment are shown by way of deduction under Minor Head 901 to 904 under Major Head 2079. Another Major Head 0079 records the receipts against sale of products to non-defence establishments, in the open market or exports, which is a credit to the Consolidated Fund of India.

Chart:6

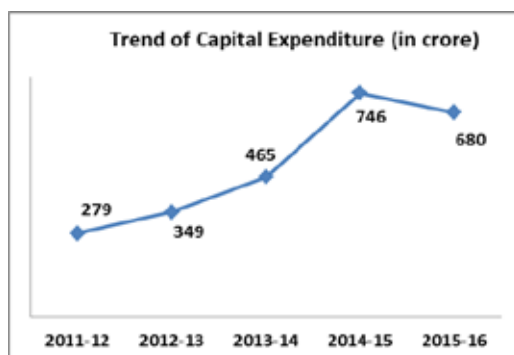


The expenditure on Stores: ₹6,520 crore which represented 46 *per cent* of the total Revenue expenditure, increased by 15 *per cent* in 2015-16 over 2014-15.

### 7.1.2.2 Capital expenditure

The Board also receives budgetary support for capital expenditure (Major Head 4076-Capital Outlay-Defence Services-04-Ordnance Factories), also called the New Capital (NC) grant. This grant meets the expenditure on new projects including procurement of plant and machinery, for which ₹680 crore was spent in 2015-16. In addition, a separate fund called the Renewal Reserve Fund (RR Fund), created through yearly transfers from revenue grant<sup>29</sup> had a balance of ₹115 crore as on 31 March 2016.

Chart:7

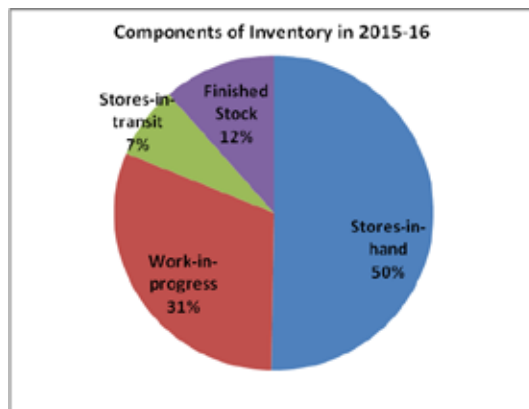


<sup>29</sup>The amount transferred from Revenue grants (Major Head 2077) annually for the RR fund is equal to the annual depreciation of plant & machinery and expenditure for annual replacement.

Capital expenditure under NC grant represented only three to five *per cent* of the total expenditure of the Ordnance Factory Board over the years. Though, nine *per cent* decrease in capital expenditure was reported in 2015-16 over last year, there had been 46 *per cent* increase in capital expenditure in 2015-16 over the figures of 2013-14 (**Chart 7**). The Ammunition & Explosive (A&E) group benefitted most from the capital procurements, accounting for 31 *per cent* of the capital expenditure.

### 7.1.2.3 Inventory holding

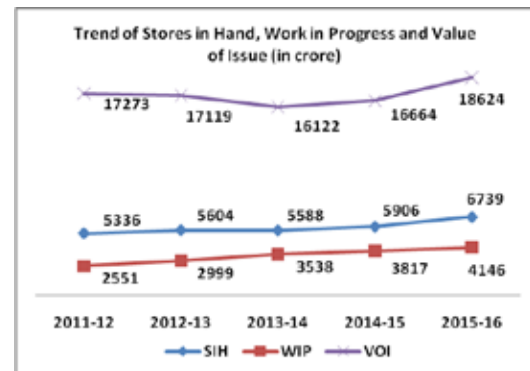
**Chart : 8**



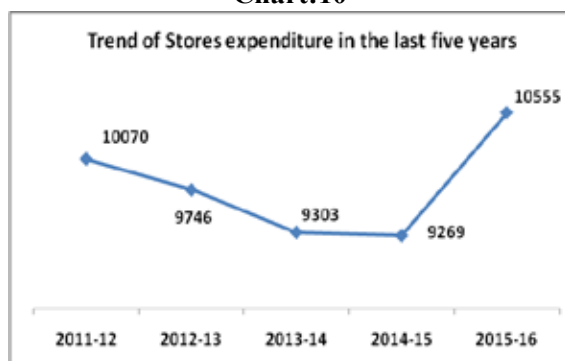
half of the inventory is the Stores-in-Hand (**Chart 8**). The Stores-in-Hand *i.e.*, stores procured for manufacture but not used within the year by the Factories of the Board, has shown an increasing trend in the last five years 2011-16. The Work-in-progress (items in semi-finished state of manufacture) also increased marginally during the period (**Chart-9**).

The inventory holding in the Factories increased by 39 *per cent* from ₹9,637 crore in 2011-12 to ₹13,408 crore in 2015-16. However, there was a marginal increase of 10 *per cent* in 2015-16 over the holding in 2014-15. The level of holding is high representing 73 *per cent* of Cost of Production in 2015-16. Exactly

**Chart : 9**



**Chart:10**



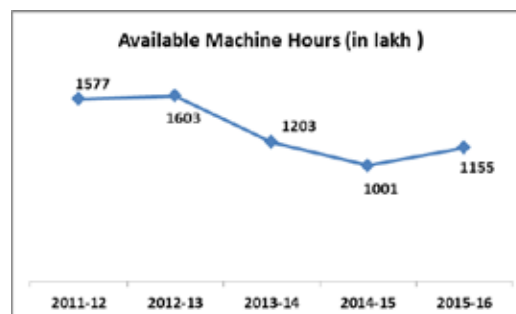
The high level of holding of inventory is a combination of several factors. In March 2010, the Board authorized the Factories for procurement to meet upto next three years' requirement along with staggered delivery<sup>30</sup>. This led to a significant holding of store inventory since 2011 (**Chart 10**).

<sup>30</sup>The decision was for “procurement of input materials including IFD items against indent upto next three years' requirement (2 years+ 50% option clause) with Price Variation Clause (for trade procurement) and staggered delivery to conform to budget allotments and shelf life of Stores”

#### 7.1.2.4 Utilisation of Machines

While the man hour utilization was reported to be 127 per cent in 2015-16, machine hour utilization was 78 per cent only. The machine hours available in 2015-16, though increased from previous year, have a declining trend in the period 2011-16 (Chart 6). The decline could be attributable to the increased down-

Chart: 11



time of machines and the fact that procurement of new machines did not keep pace with the condemnation of old & unserviceable machines. In this context, the status of un-installed plant and machinery becomes important, i.e., machines purchased but not commissioned to begin manufacture. A total of 438 machines valued at ₹512 crore were lying un-installed (March 2016) in Factories with the Weapons, Vehicles & Equipment Group and Ammunition & Explosive Group together accounting for 62 per cent of the total un-installed machinery.

#### 7.1.2.5 Ability to meet Production Targets

The production targets to factories are fixed by the Board in consultation with the Defence forces. These targets are drilled down to the factories: for final

(in number of items)			
Year	Target	Achievement	%age of Shortfall
2011-12	547	195	64
2012-13	529	205	61
2013-14	382	163	57
2014-15	693	251	64
2015-16	580	194	67

Source : Target and Achievement Report of the Board

products and for feeder factories, which are then communicated by the Board to the factories. The targets take into consideration the requirements projected by the forces and the capacity of the factories for production. It is observed (Table-27) that despite the decline of 16 per cent in assigned workload (targets), the factories continued to fall short of targets. The factories could achieve only 33 per cent of targets in 2015-16.

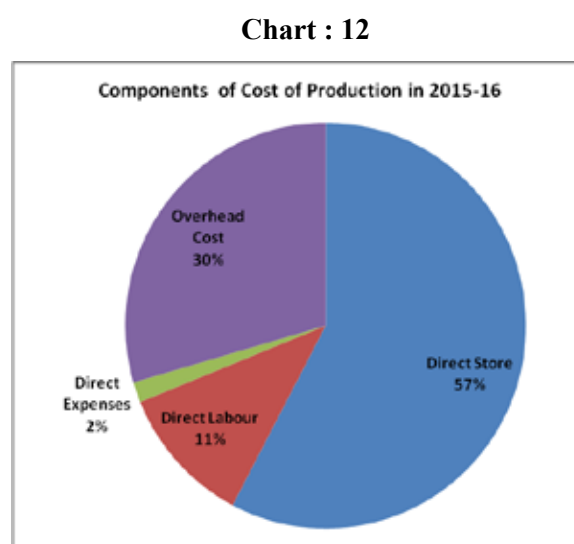
#### 7.1.2.6 Cost of Production

Cost of production in Ordnance Factories comprises direct material, direct labour and overheads. The cost of production during 2015-16 at ₹18,294 crore

showed 11 *per cent* increase over the figures of 2014-15. The main reasons for increase in cost of production were:

- A total of 1,292 principal items were produced in 2015-16 *vis-à-vis* 1120 items in 2014-15.
- The eight Ordnance Factories<sup>31</sup> contributed a total increase of ₹1657 crore over the previous year. Amongst it, six<sup>32</sup> principal items showed a total increase of ₹651 crore in cost of production.

Stores account for 57 *per cent* of the cost of production in the Ordnance Factory Board. Overheads at 30 *per cent* of the cost of production are particularly high in the Ordnance Factory Board as depicted in **Chart-12**. The composition of costs varies across operating groups (**Annexure-XI**) with the Armoured Vehicle Group and the Ammunition and Explosive (A&E) Group being most material intensive. The Ordnance Equipment Group which manufactures clothing and general purpose items was the most labour intensive among the Factories.



#### 7.1.2.7 High Cost of Overheads

The Cost of Overheads accounted for 30 *per cent* of the cost of production. The high overheads are a consequence of high committed cost on a workforce that is not directly deployed for production. Material and Components Group with some of the oldest factories of the Board reported the highest levels of overheads: fixed overheads and variable overheads being 26 *per cent* and 9 *per cent* respectively, a total of 35 *per cent* being the overheads as percentage of the cost of production.

Overheads charged in Ordnance Factories include indirect labour cost, indirect stores, supervision, electricity, transportation, depreciation, *etc.* Over the period 2011-16, the average overhead charges per annum was ₹4674 crore

<sup>31</sup>OF Khamaria, HVF Avadi, OF Chanda, OF Ambajhari, OF Bolangir, GCF Jabalpur, GSF Cossipore and OCF Shahjahanpur

<sup>32</sup>RD 84mm HEAT 551 INDG, Pinaka Rocket (PF), Rocket 84mm TPT, BMP-II (OE), Cartg 5.56mm Ball, Shell 155mm Ball HE HE M 144

which constituted (**Table-28**) around 28 *per cent* of the average annual cost of production (₹16462 crore) of Ordnance Factories Organization. Major elements of the overheads are supervision charges and indirect labour cost which together registered 60 to 70 *per cent* of total overhead cost during 2011-12 to 2015-16.

**Table-28**

(₹in crore)				
Year	Cost of Production (COP)	Overhead Cost /%age of COP	Supervision Charge/ %age of Overhead Cost	Indirect Labour Cost/ %age of Overhead Cost
2011-12	15,933	4,214 (26%)	1,799 (43%)	1,149 (27%)
2012-13	15,972	4,393 (28%)	1,867 (42%)	913 (21%)
2013-14	15,637	4,389 (28%)	1,940 (44%)	940 (21%)
2014-15	16,476	4,973 (30%)	2,103 (42%)	954 (19%)
2015-16	18,294	5,401 (30%)	2,220 (41%)	1,024 (19%)
<b>Total</b>	82,312	23,370	9,929	4,980
<b>Average</b>	16,462	4,674 (28%)	1,986 (42%)	996 (21%)

**Table-28** provides the data for 2011-12 to 2015-16 across the Factories. Analysis of major elements of overhead revealed that high supervision charges (41 to 44 *per cent*) and indirect labour charges (19 to 27 *per cent*) were main contributors to high overhead.

The main reasons for high supervision charges and indirect labour cost are holding of excess supervisory staff compared to number of industrial employees (IEs), non-reduction of indirect IEs despite induction of new CNC machines, outsourcing of house-keeping, maintenance, store-keeping and material handling and irregular payment of piece work profit to indirect IEs.

We found that over the period 2011-16, the supervisory costs (**Chart-13**) in the OF Organisation increased by 23 *per cent*. In fact, for every 2 IEs, there was one supervisor. Supervisory cost as a percentage of total labour cost was 67 to 73 *per cent* during the period 2011-16. A Committee on cadre re-structuring of Group-B cadre submitted a report in September 2012 with suggestions which could *inter-alia*

**Chart: 13**





address the high supervisory costs; the Ministry was yet to take a decision on this Report sent (October 2013) by the Board as of July 2016.

Indirect IEs are engaged in handling and transportation of materials; housekeeping, maintenance and repair work of equipment; store-keeping *etc.*, which cannot be directly charged on a specific product and hence, are accounted as Overheads<sup>33</sup>.

We observed that the number of indirect IEs remained static: 36 for every 100 direct IEs during 2011-12 to 2015-16, despite induction of new CNC machines and outsourcing of house-keeping, maintenance, storekeeping and material handling. Consequently, the Board spent ₹996 crore annually on an average on indirect IEs which accounted for 21 *per cent* of the overhead during 2011-12 to 2015-16.

### 7.1.2.8 Value of issues: Turn-over

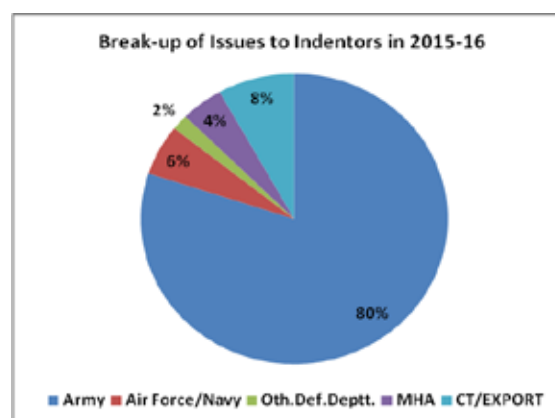
Value of Issues is worked out as the number of items manufactured multiplied by the Issue Price fixed by OFB. Value of Issues increased by 12 *per cent* from ₹16,664 crore in 2014-15 to ₹18,624 in 2015-16. However, issues to the Ministry of Home Affairs (MHA) declined by ₹79 crore in 2015-16 (from ₹650 crore in 2014-15 to ₹571 crore in 2015-16).

Major items exported in 2015-16 were to Mauritius.

The Army is the major indenter for the products of the Ordnance Factories, accounting for nearly 80 *per cent* of the total issues during the year 2015-16 (**Chart 14**) with Civil Trade and Export being second at eight *per cent*.

Issue Price is fixed by the OFB at the beginning of the year based on the trends in the past three years. OFB follows different pricing policies for different categories of indentors. Issues to the Defence indentors are supposed to be on cost basis *i.e.* no profit should be charged on such issues. Deficit incurred in respect of issues to the Army for ₹128 crore in 2015-16 against surplus of ₹161 crore in 2014-15.

**Chart : 14**



<sup>33</sup>Overheads are then apportioned across products in proportion to the Labour Costs

Table -29

<i>(₹ in crore)</i>	
<b>Indentor</b>	<b>Surplus (+) / Deficit (-)</b>
<b>Army</b>	(-) 128
<b>Navy, Air Force &amp; Other Defence Department</b>	(+) 37
<b>Defence</b>	<b>(-) 91</b>
<b>Non-Defence (MHA &amp; others)</b>	(+) 31
<b>Total</b>	<b>(-) 60</b>
<b>IFD</b>	<b>(+) 227</b>
<b>Net Surplus</b>	<b>(+) 167</b>
<i>Source : Review of Annual Accounts for 2015-16</i>	

Ordnance Factories rely mainly on sister factories for input stores, such issues are known as Inter-Factory Demand (IFD) issues. Together IFD issues reported a surplus of ₹227 crore (**Table-29**) in 2015-16, over a deficit of ₹83 crore in IFD issues in 2014-15. This is mainly due to increase in issue price of IFD items in 2015-16. The profit in IFD issues are unnecessarily inflating the cost of production in the assembling factories. Though total Defence issues reported a deficit of ₹91 crore in 2015-16, losses in their issue, are offset by surplus generated by the IFD factories.

A mid-term correction of Issue Price appears to be required for IFD items and items issued to Indentors to minimize the increasing surplus on IFD issues and also to minimize the loss in Defence sector and to earn surplus from non-Defence sector.

### 7.1.3 Our Audit Process

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 and assessment of overall internal controls and concerns of stakeholders. Previous Audit 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.

After completion of audit of each unit, Local Test Audit Reports (LTARs) 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 LTARs. Whenever the replies are received, audit findings are either settled or further action for compliance is advised. Important audit observations arising out of these LTARs 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 2015-16, audit of nine units was carried out by

employing 3910 party days. Our audit plan ensured that most significant units, which are vulnerable to risks, were covered.

We issued 487 LTAR Paragraphs during 2015-16. In addition, 1319 LTAR Paragraphs were outstanding as of 1 April 2015. A total of 538 Paragraphs were settled during 2015-16. As of 31 March 2016, 1268 LTAR Paragraphs are outstanding as detailed below:

**Table -30**

<b>Age</b>	<b>No. of Paragraphs Outstanding</b>
<b>Up to 1 Year</b>	454
<b>More than 1 Year and up to 2 Years</b>	319
<b>More than 2 Years and up to 5 Years</b>	399
<b>More than 5 Years</b>	96
<b>Total</b>	<b>1268</b>

The Ministry/Board may take appropriate action for expeditious settlement of old outstanding Paragraphs.

#### **7.1.4 Recoveries at the instance of Audit**

At the instance of Audit, Ordnance Equipment Factory, Kanpur adjusted ₹2.36 crore on account of excess payment of service charges made to the Cantonment Board Kanpur and Ordnance Factory Khamaria had recovered ₹0.45 crore from their domestic consumers on account of water charges less recovered.

## 7.2 Management of Import Contract in Ordnance Factories

### 7.2.1 Introduction

Out of a total Budget (2012-16) of ₹53,976 crore, the Ordnance Factories spent ₹23,888 crore on procurement of Stores and ₹3,093 crore on procurement of machinery. Together, these procurements accounted for 50 *per cent* of the total expenditure. Of these, stores and plant & machinery worth ₹5840 crore and ₹987 crore, which constituted 24 and 32 *per cent* respectively were procured through import.

The Transfer of Technology agreements and their associated supply contracts play a crucial role in the indigenisation efforts of the Ordnance Factory Board. In this context the management of import contracts becomes important not only to ensure timely supply of the contracted items, but also in enhancing the indigenous manufacturing capacity of the Ordnance Factories.

#### 7.2.1.1 Delegation of Financial Powers & Stages leading to the supply orders

General Managers of the Factories have been delegated financial powers up to ₹50 crore for stores and ₹25 crore for plant and machinery. In case of single tender/ proprietary items, the powers are restricted to ₹1 crore only. The Ordnance Factory Board has been delegated full financial powers for procurement. Only cases of Single Tender procurements from OEMs<sup>34</sup> exceeding value of ₹3 crore needs to be referred to the Ministry for approval.

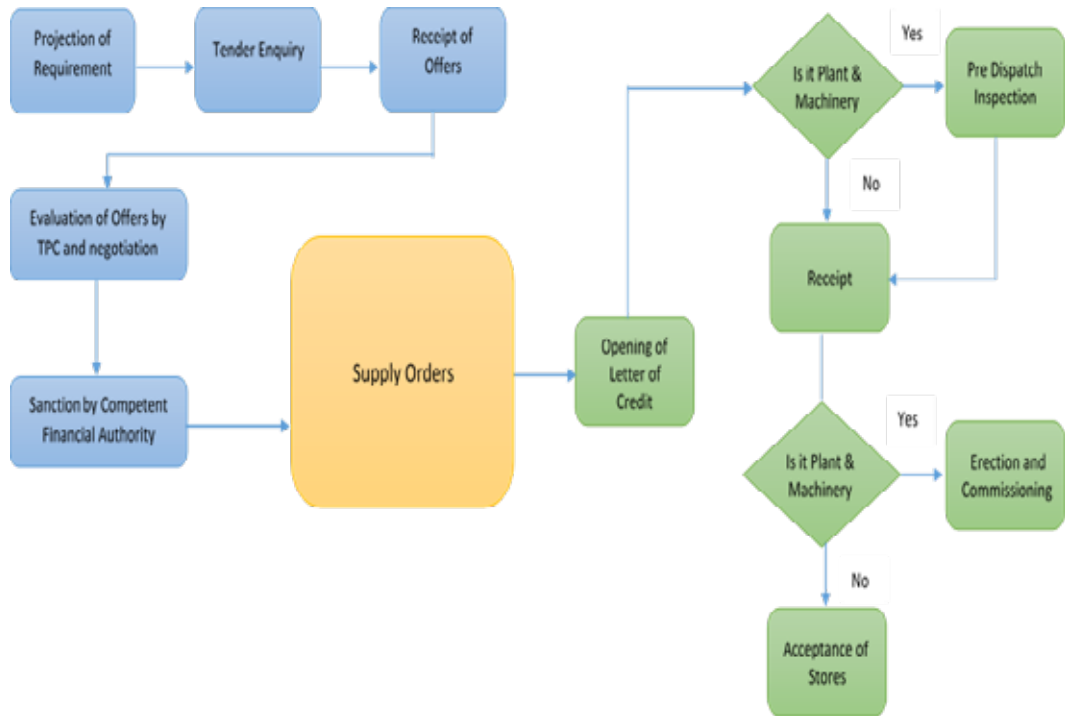
The imports of stores are mainly with respect to those items under Transfer of Technology from OEMs, which are yet to be indigenised. As such, they are proprietary items with no other available source. Yet, the Board has not been delegated full powers on these procurements.

Stages of procurement in chronological order from the projection of requirement to placing the contracts and receipt of stores/ plant and machinery are illustrated in **Chart 15** below:

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<sup>34</sup>Other than the Russian OEM, M/s ROE where the Chairman of the Board has full powers, except for product support for T-90 tanks which has been restricted to ₹20 crore.

**Chart: 15- Stages of Procurement**



This Report contains the results of a review on whether the import contracts were compliant with extant rules and were drafted, negotiated and managed to serve the best interests of the Government. We selected 28 import contracts valuing ₹805 crore concluded during 2012-15<sup>35</sup> pertaining to five ordnance factories<sup>36</sup>. Of these 28 contracts, 11 pertained to plant and machineries and balance 17 contracts were for supply of stores. We examined these contracts at both stages: pre-contract (up to the signing of the contract) as well as post-contract (up to delivery/commissioning) management. The results of Audit examination are given below:

## 7.2.2 Pre-contract Management

### 7.2.2.1 Delays in procurement

The Board’s Procurement Manual 2010(OFBPM) prescribes a time frame for placement of supply order (SO) from the date of opening of commercial offer as under:

<sup>35</sup> Contracts concluded during 2015-16 were not sampled for detailed examination considering the overlap in post contractual activities beyond 2015-16.

<sup>36</sup> The Factories being Engine Factory Avadi (Stores), Heavy Vehicles Factory Avadi (Plant and Machinery), Field Gun Factory Kanpur (Plant and Machinery), Opto Electronics Factory Dehra Dun (Stores) and Gun & Shell Factory Cossipore (Stores)

- Six weeks in case of procurement falling within the financial powers of General Manager
- 11 weeks in case of procurement falling within the financial powers of Board and
- 17 weeks in case of procurement within the financial powers of the Ministry,

We analysed the time taken in placement of SOs from the date of opening of commercial offers as indicated in **Table-31** below:

**Table 31: Analysis of time taken in placement of SOs**

Sl. No.	Sanctioning Authority	No. of SOs placed			
		Within the prescribed period	Beyond the prescribed period up to 24 weeks	Beyond 24 weeks	Total
1	GM, OF	1	12	6	19
2	OF Board	1	2	3	6
3	MOD	0	0	3	3
<b>Total</b>		<b>2</b>	<b>14</b>	<b>12</b>	<b>28</b>

As could be seen from the above, out of 28 contracts, only in two cases (7 per cent) supply orders were placed within the prescribed time. The Factories took more than 24 weeks in 36 per cent of the cases. Further, where orders were within the delegated powers of MOD, no SO could be placed within the prescribed period of 17 weeks. The delays were mainly due to procedural reasons.

#### 7.2.2.2 Negotiations with the Suppliers

OFBPM stipulates conduct of commercial negotiation mainly in case of single tender situations or when the price is considered high with reference to assessed reasonable price, irrespective of the nature of tendering by the Tender Purchase Committee (TPC) duly constituted and in case of procurement beyond Board's financial power, TPC under Chairman/Board would do commercial negotiation. This clause was at variance with Ministry of Defence instruction of May 2007<sup>37</sup> which stipulates that cases beyond the powers of the Board shall be decided upon by the Collegiate Committee constituted by them.

<sup>37</sup> The Collegiate Committee was to cut down the time taken in "seeking clarifications and proper understanding of technical issues involved in proposals received for approval from the Board". The Committee has six members including Additional Financial Advisor, Ministry of Defence. Timelines were also drawn up: the Committee was to present the competent authority with its decisions within 30 days of receipt of the proposal; another 25 days for the proposal to be put up to the Competent authority. No timeline was drawn up for approval by the competent authority.

Out of 28 contracts examined in audit, negotiations were conducted in respect of 14 contracts, representing 50 *per cent* of the sample. We observed that there was no thumb rule to suggest as to what constituted “reasonability of price” as audit scrutiny revealed that commercial negotiations were conducted even when the rates offered were lower than five *per cent* over the Last Purchase Rate (LPR) and no negotiations carried out even when the rates offered was more than 25 *per cent* over the LPR. Two such cases are discussed below:

- Gun and Shell Factory (GSF) Cossipore received (January 2014) an offer from M/s. FFV Sweden (OEM) against its TE (January 2014) for supply of 2081 barrel assembly of 84mm Rocket Launcher Mark-III at unit rate of SEK 60480 which was higher by 4.5 *per cent* over LPR. We observed that GSF concluded order only in March 2015 *i.e.*, after a lapse of 15 months from receipt of commercial offers even though the OFBPM stipulated a time frame of 17 weeks. Abnormal delay occurred due to Collegiate Committee taking 26 weeks time in offering their recommendation to the Ministry for according sanction. The main point of contention related to justification of price quoted by the foreign firm and this despite the fact that Board negotiated (June 2014) with the foreign firm by bringing down the unit rate to SEK 59298, being 2.4 *per cent* higher than LPR. Ultimately, the Collegiate Committee considered (December 2014) the negotiated rate of SEK 59298 to be reasonable which culminated in the Ministry according (March 2015) sanction to the Board. As a result of delay in according sanction by the Ministry, GSF had to face stock out situation during 2014-15 and failed to meet target of supplying 1800 numbers of 84mm Rocket Launcher Weapon during 2015-16. Even during 2015-16, GSF could supply only 1189 numbers of 84mm Rocket Launcher Weapons against the target of 1800; and
- Opto Electronic Factory (OLF), Dehradun against its TE (February 2014) received offers (March 2014) from M/s. Rosoboronexport Russia (OEM for T-90 tanks) for spares of telescopic sights (PNK-4S) which resulted in placement (August 2014) of order at offered rate of USD 183746 without any negotiation even though the rate was higher than 29 *per cent* over last supply order (July 2013). Subsequently, against another TE (June 2014) for a follow up purchase, M/s. Rosoboronexport Russia quoted USD 194458 which was five *per cent* higher than the LPR. This time, OLF conducted negotiation against which M/s. Rosoboronexport Russia reduced the rate marginally to USD 193457 and accordingly placed order in February 2015. The acceptance of the steep rise in the purchase in August 2014 had a cascading effect on subsequent purchases against order (February 2015).

### 7.2.2.3 *Lack of clarity regarding procedure for deduction of Liquidated Damages*

Under the terms of the contract, an irrevocable Letter of Credit in advance (ranging from 30-45 days) of receipt of notification from the supplier of dispatch of consignment, is required to be opened by the Factories. There is no specific condition that the Letter of Credit will be opened for an amount net of the Liquidated Damages (LD) for delays in delivery or after adjusting for material which is found unacceptable on grounds of quality, wherever applicable.

As a result, there is inconsistency in each Factory. EFA deducted payments on account of Liquidated Damages while opening the Letter of Credit for the consignment which was delayed. On the other hand, GSF released full payment in the Letter of Credit and separately raised a demand for payment of Liquidated Damages from the firm subsequently.

### 7.2.2.4 *Non inclusion of ' Liquidated Damages' clause in Supply Orders*

Even though OFBPM stipulates levy of liquidated damages (LD) for delayed supply of the indented items, we observed that in two supply orders for procurement of product support items from the OEM for T-72 tanks, LD clause was not incorporated on the pretext that both the Original ToT and the Supplementary Agreements under the ToT did not have clauses to levy LD. As a result, though the supplies against these two orders were delayed, LD of ₹1.3 crore could not be recovered from the OEM.

### 7.2.3 **Post-contract Management**

Of the 28 import orders examined in Audit, delays from the prescribed time schedule were found in 22 orders, constituting 79 *per cent* of the sampled orders. The delays ranged between two and 17 months as indicated in **Table-32**. Against five orders for plant and machineries, deliveries were yet to be made by the suppliers.

**Table 32: Delay in Delivery**

Delays	No of orders
<3 months	5
3-6 months	6
>6 months	10

Of the total 22 instances of delayed receipt, in six cases the delays were owing to delayed Pre Despatch Inspection (PDI) by the Factory (discussed in para 7.2.3.1 below) and in two cases because of delays in opening letter of credits by the Factory.



In respect of the remaining 9 cases of delayed delivery which could be attributed to the supplier, liquidated damages (LD) were not levied in respect of 5 cases amounting ₹2.09 crore.

### 7.2.3.1 Delay in Conducting Pre-despatch Inspection by Factories

The contracts on procurement of plant and machinery (P&M) contain provision for Pre-despatch inspections (PDI), whereby the Factory deputs a team to the Supplier's premises to satisfy itself, before dispatch of machinery, that it meets the specifications contained in the supply order.

We found that there was delay in PDI in 6 out of 11 contracts for P&M in the audit sample, delays ranging from 8 weeks to 28 weeks. The impact due to delayed constitution and deputation of pre dispatch team at FGK are given in the **Table-33** below:-

**Table-33: Impact of Delay in PDIs**

	Guideways CNC Lathe machine	Horizontal Machining Centre	CNC Precision Horizontal Boring & Milling machine
<b>Date of the contract</b>	July 2012	December 2012	February 2013
<b>Stipulated date of delivery</b>	September 2013	December 2013	March 2014
<b>Request for PDI</b>	May 2013	June 2013	December 2013
<b>Approval of PDI team</b>			
<b>by GM</b>	August 2013	October 2013	January 2014
<b>by Board</b>	October 2013	November 2013	January 2014
<b>by the Ministry</b>	November 2013	January 2014	May 2014
<b>Deputation of PDI team</b>	December 2013	February 2014	May 2014
<b>Decision by TPC on extension</b>	January 2014	December 2013	April 2014
<b>Actual Date of delivery</b>	April 2014	May 2014	July 2014

Had the Factory designate the PDI team in advance of the request for PDI, after placement of the supply order, the delays could have been avoided.

### 7.2.3.2 Quality issues

OFB's Procurement Manual regulates the procedures to be followed by the Factories with regard to submission of quality claims with the foreign suppliers in case the items are rejected on account of qualitative discrepancy and quality claims on account of defects or deficiencies. It, inter alia, stipulates that the quality claims for defects or deficiencies in quality noticed during the Joint Receipt Inspection shall be presented within 45 days of completion of Joint Receipt Inspection and acceptance of goods. The supply orders normally contained a clause that binds the supplier to replace or rectify the defective material within 90/100 days of receipt of the quality claims.

But the Factories were unable to enforce these conditions and quality claims were either delayed by the Factory or remained unaddressed as per the details given below:

**(i) Delay in quality claims by Ordnance Factory**

Gun Shell Factory Cossipore placed (September 2012) a supply order for 2300 barrels on M/s. FFV, Sweden (OEM) at a total cost of ₹117 crore. The barrels were to be delivered in phases from April 2013-December 2014. The first consignment of 200 barrels was received in July 2013 and September 2013, of which 25 barrels were rejected due to various defects<sup>38</sup>. Against the stipulated period of preferring quality claims within 45 days of holding Joint Receipt Inspection<sup>39</sup> as prescribed in the Manual, the Factory took an inordinate time to do so as shown in the **Table-34** below:

**Table-34: Time taken by GSF, Cossipore for Quality Claims on M/s. FFV, Sweden for supply of barrels**

Date of receipt of store	Date of quality claim	No of barrels	Time taken for claim (months)
12.09.2013	19.09.2014	25	12
12.09.13 to 17.07.14	10.01.2015	121	6 to 16
19.07.13 to 11.09.14	16.01.2015	136	4 to 16
17.07.14	23.02.2015	4	7
25.02.15	11.03.2015	6	-
05.12.13 to 17.03.15	26.05.2015	5	2 to 16
11.09.14 to 22.06.15	17.07.2015	10	1 to 10
19.07.13 to 17.07.14	25.11.2015	3	16 to 28

As the Factory raised quality claims for 310 barrels in batches of receipt of material, the OEM sent fresh stock as replacement of the rejected barrels. In all, replacement of 294 barrels during February 2015-April 2015 were received; the balance 16 barrels worth ₹72 lakh was still pending replacement as of October 2016. Referring of quality claims and resultant delayed replacement by the OEM, is to be viewed in the light of the fact that GSF had registered shortfall of 66.34 and 48.83 *per cent* in production of 84mm Rocket Launcher Mark-III weapon during 2013-14 and 2014-15 respectively.

<sup>38</sup> Ra Value more than specified, non-achievement of specified criteria in drawing dimension and technical specification of Step-up and Step-down at Commencement of Rifling, rust observed inside the chamber, Scratch mark, depression at left side of Firing Pin hole, etc.

<sup>39</sup> The clause on Joint Receipt Inspection was not included in the original ToT for 84 mm Rocket Launcher or in the Supply Orders linked to the ToT.

**(ii) Delay in resolving the quality claims by the suppliers**

Engine Factory, Avadi placed (October 2013) an order on M/s. Kerametal (Firm) for 3009 numbers of delivery valve at total cost of Euro 34423 with the stipulation to supply the sample quantity of 120 delivery valve within three months from the date of contract and bulk supply within three months of giving acceptance of samples by the Factory. The supply of the sample got delayed due to transportation problems and it was eventually received in October 2014, which was cleared in inspection. EFA accordingly accorded Bulk Production Clearance to the Firm in November 2014. Bulk supply of 2889 delivery valve was received by the factory in May 2015 against which 2275 delivery valves valuing ₹19 lakh were rejected (October 2015) due to defects in surface finish and roughness. The Factory referred quality claims on the firm in October 2015 after four months against stipulated 45 days for replacement of rejected stores, which was still awaited. Under the terms of the contract, the supplier was to replace the rejected material free of cost within 90 days of the quality claims.

Meanwhile, the Factory had placed (June 2014) another supply order for purchase of delivery valves on the Firm at a total contract value of ₹38 lakh. In case of this supply order also, the samples were accepted (September 2014), bulk clearance granted (November 2014); and the bulk supply was rejected (October 2015) due to the same defects as was in the 1<sup>st</sup> supply order. The quality claims referred in October 2015 were awaiting settlement as of December 2016.

The Factory stated that the Firm had submitted (May 2016) a sample of five rectified valves in respect of each order, which was awaiting inspection in Quality Control section.

Simultaneously, the Factory had placed (June 2014) another order on the Firm for 80 numbers of Block crank case, against which it received supplies in three consignments during June - November 2015. Of these, 17 block crank cases costing ₹95 lakh received under two consignments in June 2015 and November 2015 were rejected<sup>40</sup> by the Factory in September 2015 and February 2016 respectively. The Quality claims submitted in the same months were also awaiting free replacement (December 2016).

In all, quality claims worth ₹2.24 crore were pending settlement in four instances, for periods ranging from seven months to 10 months (September 2016) against the laid down time span of 90 to 100 days.

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<sup>40</sup> blow holes and porosity/nicks marks, steps mark and visual damages observed in cylinder liner seating bore and crank shaft bearing race bore, dimensional deviation and surface roughness value not achieved in crankshaft bearing bore and more ovality observed.

#### **7.2.4 Conclusions**

Ordnance Factories import crucial part of its stores and plant & machineries. Audit examination of selected import contracts concluded by the five factories during 2012-15 revealed that there were deficiencies in management of the contracts at pre-contract as well as post-contract stages.

Audit found that undue time was taken in negotiations and approval of supply orders as only 2 out of 28 test checked supply orders had been placed within the stipulated time frame. Provision for constitution of collegiate committee, as instructed by the Ministry with a view to reduce the time taken in negotiation and approval, had not been incorporated in the procurement manual. Further, owing to non-inclusion of clause relating to 'Liquidated Damages' with cost implications in two orders, Factories were rendered weak in enforcing timely delivery of stores from the supplier.

There were also delays in supplies ranging from 2 to 17 months: in eight cases due to delay in conduct of PDI/opening of LC by the Factories and in balance cases, on the part of suppliers. We also noticed instances of delay both in referring quality claims by the Factories and subsequent resolution of the same by the suppliers resulting in quality claims worth ₹2.24 crore remaining pending for settlement from seven to ten months. OFB may consider including a provision of LD for delayed supply as well as delay against quality claims.

The matter was referred to the Ministry of Defence/Ordnance Factory Board (November 2016); their replies were awaited (January 2017).

### **7.3 Non-revision of Labour Estimates after introduction of CNC machines and incorrect payment of Piece Work Profit**

#### **7.3.1 Introduction**

An important key for planning, execution and monitoring of production in Ordnance Factories is the Estimates of unit production cost for each item manufactured in the Factory. These contain estimates for material consumption (Material Estimate), labour cost (Labour Estimate) and also factors in the admissible rejection and wastage.

The procurement manual for plant and machinery in Ordnance Factory stipulates that for each procurement proposal for plant and machinery, an Internal Rate of Return (IRR)<sup>41</sup> or a Cost-Benefit Analysis based on savings made by inducting the machine must be made. On introduction of new machines, Factories are required (Board's directions of April 2004) to conduct proper time and motion study on the basis of which labour estimates are required to be revised<sup>42</sup>.

Introduction of CNC<sup>43</sup> machines brings in substantial benefits<sup>44</sup> because the CNC machines take less man-hours with reduction in manufacturing costs and inspection time. Once programmed, they are capable of producing items repetitively even reducing inspection time (100 *per cent* check is no longer needed).

The Board has been making incremental addition of CNC machines over the last few decades. The benefits of automation can be best measured by revision of manufacturing estimates; hence, the Board's insistence for the revision on commissioning of new plant and machinery through a time and motion study.

This audit was conducted during April to July 2015 to examine revision of labour estimates on procurement of CNC machines and its impact on payment of piece work profit and outsourcing; labour planning: reporting of available SMH and target SMH in labour planning for the period 2012-13 to 2014-15 (updated up to March 2016 wherever possible) in four Factories, *viz.* Ordnance Factory Khamaria (OFK), Ammunition Factory Kirkee (AFK), Ordnance Equipment Factory Kanpur (OEFC) and Metal & Steel Factory Ishapore

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<sup>41</sup> IRR calculations are made for purchase above ₹50 lakh which was enhanced to ₹2 crore in 2015. For purchases below this threshold, Cost-Benefit Analysis is made.

<sup>42</sup> Revision is required to take place by way of reduction of Standard Man-hours of labour due to induction of CNC machines.

<sup>43</sup> Computer Numerically Controlled machines based on microelectronics-based technology. This includes computer-aided design and drafting (CAD), computer-aided manufacturing (CAM), flexible manufacturing systems (FMS).

<sup>44</sup> Our contact (June 2015) with Central Manufacturing Technology Institute (CMTI) and visit to Bharat Forge Limited (BFL), Pune (July 2015) confirmed the multiple benefits of introduction of CNC machines.

(MSF), which had high incidences of labour cost. For detailed examination of estimates, we selected 20 principal items, five from each selected factory.

### 7.3.2 Non revision of labour estimates

Between 2010-11 and 2014-15, 45 CNC machines were procured and commissioned at a cost of ₹39.10 crore in the four selected factories for manufacture of the 20 selected items. The introduction of 45 new CNC machines necessitated revision of 33 labour estimates. We however found that notwithstanding the instructions issued by the Board, none of these Factories had conducted time and motion study after commissioning of new machines. As a result, revision of labour estimates based on time and motion study was not carried out in respect of any of the selected items. In eight cases, the labour estimates were however revised based on the cycle time of the new machines. Revision of labour estimates were not carried out in 25 cases (76 per cent). Factory-wise details are shown in **Table-35** below.

**Table-35: Non-revision of labour estimates**

Factory	No. of machines commissioned	No. of estimates to be revised as per time & motion study	No. of estimates revised as per cycle time	No. of estimates not revised at all
AFK	15	6 <sup>45</sup>	2	4 <sup>46</sup>
OFK	7	8 <sup>47</sup>	2	6
MSF	10	6	4	2 <sup>48</sup>
OEFC	13	13	0	13
<b>Total</b>	<b>45</b>	<b>33</b>	<b>8</b>	<b>25</b>

The Engineering Division of the Board sought (February 2015) to collate data on savings accrued by way of revision of estimates from Factories with a deadline of 15 March 2015, which was not provided by the Factories so far (March 2016).

In February 2016, pursuant to audit's comments, Board instructed all the Factories to revise the material and labour estimates with reference to the projected IRR/Cost benefits analysis. It also stated that approval of new plant and machinery would be linked to revision of estimates for the machines already commissioned. In March 2016, Secretary (Defence Production) further stressed the need for adopting scientific process for ascertaining exact labour savings and to ensure that the existing system of revision of estimates was robust.

<sup>45</sup> Multiple machines were involved for different/same operation against same estimates.

<sup>46</sup> Estimate No. 12,886 (involving two operations in two machines) was revised for only one operation.

<sup>47</sup> Four estimates were involved for two machines.

<sup>48</sup> Only Unavoidable Rejection (UAR) percentage revised and labour estimate was not revised.

In response to the draft audit paragraph seeking reasons for non-revision of estimates, the Ministry stated (August 2016) that:

- The requisite reduction in estimates had since been carried out. (MSF)
- Revision of six estimates was not done due to non-reduction of cycle time of the newly commissioned machines. (OFK)
- The estimates were linked to case gauging and lead swaging machine which were replaced on a like to like basis and hence no scope for revision. (AFK)
- Estimates would be reviewed and action taken accordingly. Regarding the superfluous operations, their rationalisation was underway. (OEFC)

Our further verification of estimates revealed that:

- At OFK, the date of last revision of the estimates relating to the machines in question ranged between 1983 and 2004. The new machines were procured between 2011 and 2014. Further, the factory management while responding to the Audit query in July 2015/April 2016 had admitted that revision of estimates against two machines<sup>49</sup> could not be done due to repeated quality problem and frequent breakdown of one machine and non-proving of components in another machine.
- At AFK, the rated output/capacity of the new machines procured was higher and therefore warranted review of labour estimates.
- Revision of estimates at OEFC was under process and yet to be approved.
- At OEF Kanpur not a single estimate was revised out of 13 which should have been revised. We noticed instances of superfluous operations in OEF Kanpur, where new machines commissioned in the Factory made a number of operations for manufacture of Short Plain Weaves Poly & Viscose Dope Dyed, Bag Sleeping MK-4, Heater Space Oil Burning and Tent Extendable Frame Support 4M, redundant. However, the estimates were not revised and the Factory continued to engage labour for these redundant operations in manufacture of these items.

### **7.3.3 Payment of Piece Work Profit (PWP) in excess of admissibility at MSF, Ishapore**

Output Standard Man hour (SMH) for an item is product of the estimated SMH required to produce a unit item and the number of items manufactured in a month. Input SMH is the aggregation of the actual attendance hours in a month by each Industrial Employee (IE). Piece Work Profit (PWP) is a

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<sup>49</sup> Relating to machine Regd. No. 10503 and 10519

measure of the efficiency of the worker (multiplied by a factor of 1.25) and calculated as:

$$\text{PWP percentage} = [(1.25 * \text{Output SMH} - \text{Input SMH}) / \text{Input SMH}] * 100.$$

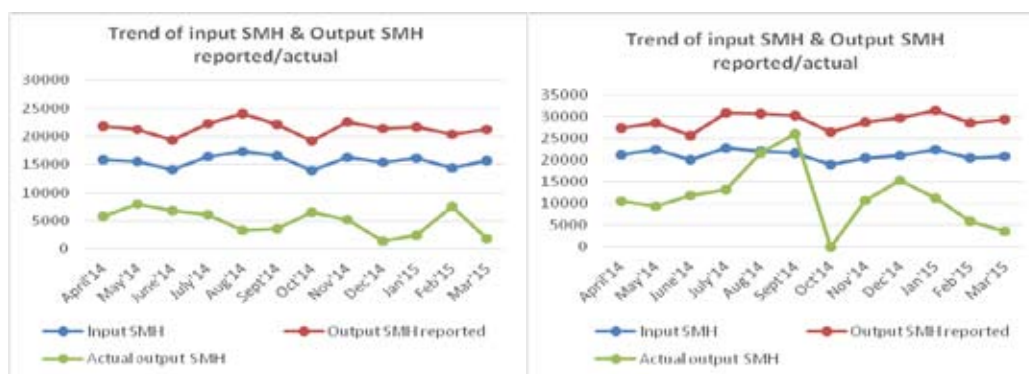
We selected five production Shops at MSF and measured the shop-wise Output SMH for each item manufactured during a month and compared it with the Output SMH reported by the Shop for the month. This was done for three years 2012-15.

We found that the actual Output SMH was less than the Input SMH in three Shops (Gun Machine Shop, Tool Room Shop and New Gun Forging Shop) in 99 instances (97 per cent) out of 102<sup>50</sup>. Hence, no PWP was admissible<sup>51</sup> during these months. Yet, PWP aggregating ₹2.60 crore was paid in all the months by inflating the Output SMH.

**Chart-16 & Chart-17** illustrate the trends in Gun Machine Shop (GMS) and Tool Room Shop (TRS) respectively in 2014-15, indicating reported Output SMH more than Input SMH though actual Output SMH was less than Input SMH.

**Chart-16: GMS**

**Chart-17: TRS**



The Ministry stated (March 2016) that there was no deficiency between input and output hours at MSF and for GMS section having large number of product mix, output could not be measured based on a particular item produced during a month.

The reply is not acceptable as we calculated the output SMH with reference to month/section-wise production data of each item furnished (July 2015) by the

<sup>50</sup>Number of instances was 108 (12 months\*3 production shops\*3 years). For six instances (October & November 2012 for each shop), data was not available.

<sup>51</sup> Due to multiplication of 1.25 factor with output SMH, PWP was admissible in 3 instances: 11 per cent in April 2012 for GMS and 23 and 50 per cent in August 2014 and September 2014 respectively for TRS.



Factory management. During subsequent verification (March 2016), the Factory could not furnish item-wise daily production report of the sections concerned in support of their claim of higher output SMH than input SMH.

#### 7.3.4 Payment of PWP to indirect workers

As per the Manual<sup>52</sup>, fixation of piece work rates for a piece of work/operation is only feasible if the particular work is measurable *i.e.*, a reasonable estimation of the volume and nature of work involved can be made. Accordingly, no piecework rates can normally be fixed for indirect services, repair jobs, *etc.*, which should be carried out on day work basis. Thus no PWP is payable to indirect workers, non-productive/ service sections *etc.* However, the Manual prescribes payment of “Incentive Bonus”<sup>53</sup> to maintenance workers<sup>54</sup> of production sections restricted to 50 *per cent* of the PWP earned by the piece workers of such section.

**Table-36: SMH booked for indirect work**

Factory	Year	SMH booked (in lakh hours)	Payment of PWP (₹ in lakh)
OFK	2012-13	4.31	44.84
	2013-14	4.35	42.01
	2014-15	5.40	84.75
MSF	2012-13	1.20	9.82
	2013-14	0.76	5.88
	2014-15	0.46	6.84
OEFC	2012-13	0.05	0.56
	2013-14	0.0001	0.01
	2014-15	0.01	0.19
AFK	2012-13	0.87	8.00
	2013-14	1.22	11.24
	2014-15	0.80	13.03

We found that the sampled Factories booked piece-work hours in 01 and 02 series which are meant for indirect work orders (**Table-36**). Some of these jobs included printing of invitation cards, Service Books, Leave Accounts, Souvenir for singing competition, removal of debris, collection of scrap from different section, *etc.*, which had no relation with production and should not be booked in the piece work card as per the provisions of the Manual. We also found that OEFC paid PWP worth ₹86.59 lakh to those who were posted in

<sup>52</sup> Para 231 of DAD OM Part-VI (Vol-I)

<sup>53</sup> Para 155 of DAD OM Part-VI (Vol-I)

<sup>54</sup> Maintenance workers not attached to production section are paid incentive bonus at 50 *per cent* of the average PWP earned by the piece workers in the whole factory.

store issue (April 2012-March 2015), store stock (April-August 2012) and R&D Section (April 2012-April 2014) *i.e.* non-productive sections. Similarly, OFK paid PWP worth ₹1.58 crore to indirect IEs engaged in non-production works like inspection, supervision, godown keeping, in-house R&D, *etc.*

While accepting the observations, the Ministry stated (August 2016) that employees in the printing press of the MSF had since been diverted to direct production works and piece work booking against care and custody had since been stopped at OEFC.

### 7.3.5 Under-reporting of Available SMH

We analysed the Target SMH and Available SMH in the sampled Factories during the period 2012-15 and observed that the Factories under-reported the available SMH in eight of 10 instances by applying incorrect normative SMH/IE/annum. In two cases, there was over-reporting of available SMH. The SMH per IE per annum applied by the Factories ranged from 2348 to 2831 in 2012-13 as against the prescribed SMH of 2691.36. In 2013-14 to 2014-15, the Factories applied SMH per IE per annum ranging from 2391 to 2859 as against the prescribed 3019.68 hours. The extent of under-reporting was up to 22 *per cent* in AF Kirkee as shown in **Table-37** below:

**Table-37: Available SMH *vis-a-vis* Target SMH**

Year	Target SMH	Available SMH as per norms	Available SMH reported
(in lakh hours)			
<b>Ammunition Factory Kirkee</b>			
2012-13	109.19	83.30	72.68
2013-14	93.31	88.87	70.38
2014-15	92.59	88.99	69.81
<b>Ordnance Factory Khamaria</b>			
2012-13	99.69	79.80	83.93
2013-14	101.66	86.73	82.11
2014-15	107.35	104.48	82.45
<b>Metal and Steel Factory Ishapore</b>			
2012-13	29.60	28.58	29.65
2013-14	30.08	29.86	27.72
2014-15	29.00	28.26	25.30
<b>Ordnance Equipment Factory Kanpur</b>			
2012-13	107.62	61.39	NA
2013-14	96.91	68.49	NA
2014-15	90.44	67.04	55.68

While accepting the facts, the Ministry stated (August 2016) that once the norms for available SMH were rationalised, then all Factories would utilise the same for calculation of available SMH.

The Board issued (June 2016) instructions to all the General Managers to follow uniform norm for available SMH per IE per annum as 2947 hours.

### 7.3.6 Over-estimation of Target SMH

We noticed instances of over-estimation of Target SMH by raising the estimated labour hours per unit production of an item in two cases as illustrated below:

- Metal & Steel Factory, Ishapore used a higher measure of estimated labour hours in 2014-15 for different items, than the approved SMH provided in the Estimates, resulting in higher estimation of Target SMH as shown in **Table-38** below:

**Table-38: Excess Target SMH shown by MSF Ishapore**

Item	Estimated labour hours per unit production		Production target for 2014-15	Extra Target SMH
	for 2013-14	for 2014-15		
	(i)	(ii)	(iii)	((ii)-(i))*(iii)
Steel Rod 32mm Dia	0.79	0.85502	1,15,014	7,478
Brass Pressing Blanks	0.77	0.77782	75,289	589
Pre-form Blank for Pinaka	75.26	77.24778	3,000	5,963
Cold Swaging Barrel Blank	119.79	200.52588	107	8,639
TA Pin	10.58	14.11343	12,000	42,401
T-72 Casing	675.24	675.26719	150	4
Forging for Cylinder	31.88	86.68712	50	2,740
<b>Total</b>				<b>67,814</b>

- Similarly, OF Khamaria used higher labour estimates than the approved estimate leading to over-estimation of Target SMH for seven items by 1.10 lakh SMH in 2013-14.

The Ministry stated that for MSF, there was error in compilation of data; and for OFK, upward revision of estimates was necessitated due to proof, material testing and actual requirement.

The reply regarding OFK is not tenable as no approval from the Board was obtained for upward revision of SMH as required under the Manual<sup>55</sup>.

<sup>55</sup> Para 109 of DADOM Part-VI, Vol-I

### 7.3.7 Outsourcing of operations without corresponding reduction in estimates

As per Defence Accounts Department Office Manual Part-VI, before accepting the proposal for service assistance, separate estimate is to be prepared for concerned product after removing the manpower authorised in the original estimate and ensuring inclusion of authorisation of drawal of outsourced material in the estimate.

We found that while the Factories were outsourcing jobs/ operations included in the Estimates, the corresponding SMH relating to the outsourced operations were not deducted while calculating the Output SMH. This led to excess payment of ₹10.94 crore made to the IEs in case of the sample items selected (Table-39) during the period of three years (2012-13 to 2014-15).

**Table-39: Payment to piece workers for outsourced operations**

Factory	Item of Work	Value of Outsourcing contract (₹ in crore)	SMH related to outsourced operations	Excess payment to piece workers (₹ in crore)
AFK	Transportation and unloading of materials from store to production shop	0.93	1,82,792	2.30
OEFC	Shifting, loading and collection of stores	8.76	5,18,026	8.64

The Ministry stated (August 2016) that:

- Reduction in estimates had since been effected in respect of operations outsourced (AFK);
- Rationalisation of estimates was underway which would be completed soon (OEFC).

### 7.3.8 Conclusions

Board mandates the Factories to revise the Labour Estimates after introduction of CNC machines. The Estimate quantifies the unit labour cost for each item of production and serves as the template for labour planning, deployment and control on costs. But in three-fourth of the sampled cases examined, the Factories did not revise the labour estimates.

Factories by deviating from the norms laid down by the Board over-estimated the labour hours (SMH) required for meeting targets and under-estimated the

available SMH. The Target SMH and Available SMH figures being unreliable, labour planning in the Factories was deficient to that extent. At MSF Ishapore, actual output SMH was less than those reported resulting in excess payment of Piece Work Profit (PWP) to direct Industrial Employees. Further, payments of PWP to indirect workers (not eligible for PWP) were also noticed.

We found that despite outsourcing, the in-house IEs were paid on the basis of Estimates from which the outsourcing element (in the form of SMH) had not been deducted.

### **7.3.9 Recommendations**

- ❖ The Board must ensure that the Factories revise the labour Estimates immediately after completion of the first production cycle, across products where new plant and machinery are commissioned.
- ❖ The Board should issue instruction to the Factories to adhere to laid down norms for calculation of available and target SMH.
- ❖ The Board must issue instruction to Factories to exclude outsourced operations from the Estimates in order to avoid extra payment to IEs. The practice of payment of PWP to indirect workers should be stopped except in case they are engaged in the production activities similar to those of direct IEs.

## **7.4 Management of Manufacture Warrants**

### **7.4.1 Introduction**

A warrant constitutes the authority of the ordnance factory management to the production shops concerned for putting the work in hand. Warrants are issued by the planning section of a Factory to the production shop and prescribe the order quantity to be produced. Warrants are constituted in two parts viz. Material Warrant<sup>56</sup> and Manufacture Warrant each authorising drawal of the material and deployment of labour respectively for the production. ‘Manufacture Warrants’ are the authority to the shops to undertake work placed on the Factory. The labour part of the warrant records the number of authorised Standard Manhours (SMH) required to manufacture the order quantity based on estimate.

#### ***7.4.1.1 Opening and closing of warrants***

The Manual<sup>57</sup> stipulates that normal duration of warrants for works other than capital works is six months and production is required to be completed within six months<sup>58</sup>. The warrants are therefore required to be open only for six months. Further extension for keeping the warrant open wherever necessary would be subjected to the prior approval of the Board. The Manual also prescribes that a large work order can be divided into compartments, with a warrant against each compartment to ensure that production is completed and the warrant closed within the prescribed period of six months. Replacement warrant is issued for works to cover the articles found defective in the course of manufacture.

#### ***7.4.1.2 Risks of open warrants***

The opening of warrants for more than six months is fraught with following deficiencies:

- It allows the Factories to keep items that remain semi-finished because of short closure, rejection or failed production, in the form of work-in-progress in open warrants, without regularisation.
- When multiple warrants are opened for one product (in order to meet the ordered quantity), open warrants provide an opportunity to spread rejections across warrants in order to keep it within the normal rejection

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<sup>56</sup> The issues on material warrants was earlier covered in Inventory Management in Ordnance Factories (Paragraph 8.2 of Report No. 35 of 2014)

<sup>57</sup> Para 619A and 620 of DADOM Part-VI

<sup>58</sup> Warrants for production of Armoured vehicles, ordnance and carriage components may be issued for one year without reference to the Board.

limits or transfer excess material or excess labour drawn to other warrant (s) through *Transfer Vouchers (TV)*.

- Till such time the warrant is closed, the cost of production cannot be ascertained. Thus, the Factories may not be in a position to know if they are incurring losses in production and hence may not be able to take timely corrective action.

As per the Manual, in order to highlight abnormal/irregular features in the progress of manufacture to the notice of the factory management for corrective action in times, Accounts Office (AO) of the Factory is required to consult the original documents, analyse the cost closely and critically for detecting abnormalities/irregularities like belated documentation, advance labour payments before drawal of material, over drawal of material, loose estimation, non-closure of warrants within the stipulated period even when production is completed.

Detailed analysis of these warrants is incorporated in a quarterly report called 'Concurrent Review of Production Cost and Activities' and is sent to the office of the Principal Controller of Accounts(PCA) (Factories) for further action at the Board level.

This audit was conducted to examine the management of Manufacturing Warrants issued during 2012-13 to 2014-15, in four Factories *viz.* Ordnance Factory Khamaria (OFK), Ammunition Factory Kirkee (AFK), Ordnance Equipment Factory Kanpur (OEFC) and Metal & Steel Factory Ishapore (MSF). For detailed examination of warrants, we selected 20 principal items, five from each selected Factory.

## **Audit Findings**

### **7.4.2 Non-closure of warrants in time and the impact thereof**

We found that the status of outstanding warrants was not reviewed by the Board in the Board meeting regularly except for five occasions during 2012-13 to 2014-15. In view of large number of outstanding warrants (14,594 as of 30 September 2012) in all the Factories, the Board decided (November 2012) to close all the outstanding warrants issued up to 2011-12 in a phased manner by December 2013. In the subsequent Board meetings (July and November 2013), the Board, as a routine exercise, only noted the status and requested Operating Division Members to expedite Factories for early closure of old warrants on priority but without any comment/action on the deficiencies in the follow up action taken by the Factories on the Board's earlier decision of November 2012. The office of the PCA (Factories) reviewed the quarterly reports on Concurrent Review of production cost and production activities sent

by the Accounts Office of the Factories. However, they did not submit a consolidated status report along with comments on abnormal/irregular features relating to various warrants to the Board for further corrective action.

As the review mechanism of the outstanding warrants was not effective both at the Factory and Board level, the number of outstanding warrants across all the Factories increased over the period 2012-15 by 69 *per cent*. As of March 2015, the number of such open warrants was as high as 24,706, which pertained even to the period as old as 1999-2000. Year-wise breakup of the outstanding warrants amongst all the Factories is shown in **Annexure-XII**.

As far as the Factories selected for audit, we found that only 189 (27 *per cent*) of 693 warrants<sup>59</sup> sampled in Audit and issued between 2012-13 and 2014-15 were closed within the six-month period across the four sampled Factories. While 403 (80 *per cent*) of the remaining warrants were closed after the stipulated period, 101 warrants (15 *per cent*) were still open and awaiting closure (March 2015). Since such warrants were open beyond six months, approval for the same should have been obtained from the Board. Factory-wise breakup of the warrants not closed within the stipulated time frame is tabulated as follows:

**Table-40: Age-wise analysis of delay in closure of warrants**

(Figure in numbers)

Factory	Warrants issued for selected items	Warrants closed within six months	Warrants closed between six and 18 months	Warrants closed between 18 and 36 months	Warrants yet to be closed as of 31.03.2015	
					More than six months old	Not due for closure
OFK	50	10	33	7	0	0
MSF	146	81	47	6	4	8
OEFC	305	52	139	4	78	32
AFK	248	46	99	68	19	16
<b>Total</b>	<b>(749-56) =693</b>	<b>189</b>	<b>318</b>	<b>85</b>	<b>101</b>	<b>56</b>

The Ministry attributed (August 2016) the reasons for keeping the warrant open beyond six months to:

- Time taken to regularise the manufacturing loss against some warrants.
- Time involved in quality checks including proofing and further investigation of proof failure.

Notwithstanding the reasons given, as all such factors have duly been considered while fixing the time limit of six months for closure of each

<sup>59</sup> Total number of warrants for selected 20 items issued from April 2012 to March 2015 (749) – Warrants issued during the last six months (56)=693



warrant, keeping the warrants open beyond six months without the approval of the Board was irregular.

#### **7.4.2.1 Excess booking of labour across open warrants**

The following case studies capture the *modus-operandi* of the Factories to transfer rejections and excess booking of labour across open warrants.

#### **Case Study 1: Metal & Steel Factory, Ishapore**

##### ***Production of 30 mm (Sarath) Cartridge Cases: Reluctance to take remedial measures to control abnormal losses***

The Factory opened the warrant (No. 8410/0) in August 2012 for manufacture of 38,092 numbers of 30 mm (Sarath) Cartridge Cases. But against the “normal” rejection limits<sup>60</sup> of 13 per cent (4,952 cartridge cases), 38 per cent of production (14,565 cartridge cases) were rejected in proof test. Abnormal rejection of 9,613 cartridge cases costing ₹1.54 crore was a loss against that warrant, which needed to be regularised.

However, instead of analysing the reasons of abnormal rejections and taking remedial measures, the Factory, in November 2013, transferred 12,351.32 SMH (required to produce 10,000 cartridge cases) to other two warrants (8796/0 and 8743/0) where the rejection was low and within the permissible limits. However, no material was transferred from the warrant (8410/0) to the new warrants. By doing so, the rejection level in all three warrants remained within the “normal” limit of 13 per cent of the manufactured quantity. Thus by manoeuvring the warrants, the loss worth ₹1.54 crore caused by excessive rejection in warrant No. 8410/0 was covered up. No reasons were recorded for the necessity for the two labour transfer vouchers (TVs). This apart, excess booking of material in the cost card equivalent to 14,565 rejected cartridge cases against the warrant 8410/0 completed with accepted quantity of 23,527 cartridge cases distorted the cost of production in this warrant.

Moreover, the Manual states that Piece Work Profit (PWP) can be paid only for items that are cleared in inspection. But in this case, PW payment was made for the entire quantity produced, including rejection, leading to excess payment of ₹12.90 lakh.

The Ministry stated (August 2016) that inspection is a long drawn process and till such time the results are received, the Industrial Employee (IE) has to be paid and the costs booked in the Piece Work Cards. When the lot subsequently failed in proof, the SMH for 10,000 rejected cases was transferred to other warrants to ensure disallowance of labour wages. In the

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<sup>60</sup> Defined as the Unavoidable Rejection - UAR

new warrant (8796/0), another lot of 10,000 cases were manufactured where no labour was booked in the PW card.

The reply is not acceptable since the Rules neither allow any warrant to be kept open for more than six months nor payment of PWP for rejected items. Further, TVs are not to be generated to spread a rejection across warrants as the issue of rejections in the course of manufacture needs to be addressed by means of replacement warrant. This approach of suppressing abnormal rejections and reluctance to learn from mistakes and take remedial measures is extremely unfortunate.

### **Case Study 2: Ammunition Factory, Kirkee**

#### ***Production of Fuze DA5A: Warrant no. 1110030000, 1220030000***

In all, the Factory was holding 41 lots of the rejected Fuze DA5A required for 51mm Bomb High Explosive (HE) against production during 2011-12 to 2014-15 for which final acceptance was awaited (September 2015) from Senior Quality Assurance Establishment (SQAE). The Factory did not regularise the transaction in the original warrants but transferred both labour and material cost of products, which were initially rejected, to another warrant at the time of closure to avoid recording of abnormal rejection in the original warrant.

The Ministry stated (August 2016) that the parent warrant had to be short closed within six months and the excess materials drawn (semi-finished condition) along with labour cost booked were transferred to the new warrant.

The reply clearly indicates that the OFB/Ministry are more focused on technically obfuscating the manufacturing/workmanship deficiencies rather than taking remedial measures so as to bring down rejections within reasonable levels in future.

### **Case Study 3: Ordnance Factory, Khamaria**

#### ***Production of Link Belt of 30mm Naval ammunition: Warrant No.M0020***

The Factory issued the warrant in May 2011 for manufacture of 50,000 Link Belt of 30mm Naval ammunition. But after manufacturing the ordered quantity, it was found that 4,817 SMH (₹2.21 lakh) was booked in excess and therefore transferred (November 2013) through a TV to another warrant (No. P0010) issued in April 2013 for manufacture of Cartridge Case of 40mm L/70 ammunition. Transfer of SMH was facilitated by keeping the warrant open for 30 months. Since such transfers can only be made in respect of similar items, the transfer made by OFK in the subject case was therefore unauthorised.

While accepting the observations, the Ministry stated that a Board of Enquiry was constituted in 2013 and responsibility was fixed to avoid erroneous posting of labour hours from one warrant to another and related anomaly in future.

### 7.4.3 Issue of Transfer Vouchers

The Manual<sup>61</sup> allows the preparation and use of Transfer Vouchers (TV)<sup>62</sup> for correction of wrong booking of labour, rectification of mistakes and transfer of expenditure from one work order to another by debiting the order for which the labour has actually been utilised and crediting the order on which the labour is drawn. As an internal control to check its use, it must be en faced with certificate on the necessity of their preparation, by the Assistant Works Manager to be sent to the Accounts Office. The TVs are first registered in the Costing Section and passed on to the Material and Labour Sections for checking and posting on warrants and the priced TVs are returned to Costing Section for adding the overhead charges. Thereafter, the TVs along with allocation sheets *etc.* are sent to Electronic Data Processing (EDP) Section for the preparation of the abstract of TVs, which when received back are posted in the cost cards through costing package.

We examined the prevalence of TVs in sampled Factories as also the compliance with the controls on its use. We found that:

- OF Khamaria prepared 1,380 TVs valuing ₹ 91 crore (material ₹89.91 crore + labour ₹0.65 crore) between 2012-13 and 2014-15 without citing any reason. We also found that these were neither accounted in the relevant Cost Cards<sup>63</sup> by debiting the warrant from which the transfer took place and crediting the recipient warrant. Thus, not only were the norms for issue of TV violated but the transaction also distorted the cost of production of the items.
- 2,662 TVs were prepared by OEF Kanpur during 2012-13 to 2014-15 without citing reasons for initiation of the TVs. These included 74 TVs for transfer of 4211.26 SMH across different series of Work Orders<sup>64</sup>. Further, two TVs were prepared by the Factory and the labour transferred to a warrant that did not exist.

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<sup>61</sup> Para 626(A) of DADOM Part-VI

<sup>62</sup> In case of material if materials drawn against one order and are unavoidably used for another, the concerned AWM will prepare a transfer voucher crediting the Order on which the materials were drawn and debiting the order for which the materials have actually been utilized.

<sup>63</sup> When labour hours are transferred from one warrant to another, the overheads are also transferred since overheads are charged as a percentage of labour cost. The TVs are posted in the cost cards based on abstract of transfer vouchers.

<sup>64</sup> From work orders relating to items for issue to Army, Sister Factory and Factory's own stock to Work Orders relating to Departmental series.

- OEF Kanpur raised TVs and transferred 39.43 lakh SMH valuing ₹65.79 crore, which were drawn in excess of the authorised SMH. We found that the originating cost card had not been debited correspondingly.
- 16 TVs were prepared (2012-13 to 2014-15) at MSF Ishapore and OF Khamaria to transfer various items from the Direct Work Order series (*i.e.*, items manufactured in final stage of production and on completion, are to be directly issued to the indenter) to a Component Work Order series (on which manufacturing would need to commence *ab-initio*) and *vice-versa*. This casts doubts that the items may have been rejected in quality assurance and hence, the labour hours transferred.
- AF Kirkee prepared 1,368 TVs without the authentication by the Assistant Works Manager of the shop.

Ministry, in their reply, while accepting the facts, stated that instructions were issued (February 2016) to minimise the use of TVs and to provide proper justifications as per norms. It was further added that the Board would monitor compliance report from the Factories.

#### **7.4.4 Inadequate controls on warrants**

We also found irregularities which together with the use of TVs, show the absence of internal controls on production. These are summarised below:

- During 2012-13 to 2014-15, OEF Kanpur booked labour costs of ₹3.80 crore against 87 warrants that had since been closed. While the Ministry attributed the anomaly to oversight, the matter is serious and points towards inadequacies in the internal controls.
- Production cannot commence without drawal of material. In AFK and OEFC, 1,249 number of warrants were closed during 2012-15 after booking ₹61.50 crore for labour without drawing any material. Besides, 22 warrants issued from 2012 onwards were kept open by AFK after booking of labour valuing ₹1.70 crore without drawing any material.

The Ministry stated in reply (August 2016) that the warrants were completed by drawing the materials from shop saving and transferring semi finished material from other warrants.

Considering the established labour to material ratio of 1:5.4 (average over 2012-15), the reply however has a connotation suggesting that material worth ₹341.28 crore had been lying unaccounted in factory shops which was stated to have been consumed by engaging labour worth ₹63.20 crore.

- In OF Khamaria, we found 11 instances of lot date/Inspection Notes of the items manufactured which were issued prior to date of issue of warrants; 14 instances of labour booked after the items/lots were accepted in inspection.

The Ministry stated (August 2016) that such transactions happened in case of urgency expressed by other indenter as well as availability of money from them, when the passed lots were diverted to these indentors and the corresponding proportionate material and labour were transferred to the warrants issued against appropriate Work Orders.

The reply is not convincing as issue of finished items before opening of warrants and booking of labour after acceptance of finished items in inspection against a particular warrant make a mockery of manual provisions on warrant management.

#### **7.4.5 Conclusions**

The warrants are required to be closed within six months of its issue. Keeping warrants open for unduly long periods is fraught with risk of allowing unauthorised adjustments. Open warrants provided an opportunity to the Factories to spread rejections across warrants (in order to keep it within the normal rejection limits) or transfer excess material or excess labour drawn to other warrant through Transfer Vouchers. Transfer Vouchers were being used in the Factories without following the relevant internal controls.

#### **7.4.6 Recommendations**

- ❖ Given the large scale non-adherence to the specified life of the warrants, there is a need to look at standardised life of the warrant. Instead of having a uniform life of six months for every warrant, OF should fix life of the warrants keeping in view the requirements of each warrant. Keeping the warrant open for unduly long periods should be discouraged.
- ❖ Transfer Voucher should be used for catering to genuine adjustments. These should not be used for hiding abnormal losses.
- ❖ Cases of abnormal losses should be investigated and measures should be taken to remedy the weakness in the system as well as to address the instances of negligence or misdemeanour.

## 7.5 Procurement of defective Radiators

**Heavy Vehicles Factory, Avadi placed an order for Radiators to be fitted in T-90 tanks on a firm which had no prior experience of manufacturing required Radiators. The Factory accepted Radiators worth ₹2.78 crore which did not conform to the stipulated technical requirements and rendered T-90 tanks fitted with such Radiators unacceptable to Army.**

In order to fulfill the Army's indent (November 2004) for supply of 300 T-90 Tanks<sup>65</sup> (Tank) in phases between 2006-07 and 2009-10, Heavy Vehicles Factory Avadi (HVF) issued a Tender Enquiry (May 2005) for procurement of 102 Racks with radiators<sup>66</sup> (Radiators). HVF received offers from four firms<sup>67</sup>. A Technical Committee, constituted to assess the capacity verification of these firms, reported (May 2006) that only the Mumbai-based Firm 'B' had the experience and the facilities for manufacture of similar type of Radiators and had developed Radiator cores for Combat Vehicles Research and Development Establishment, Avadi (CVRDE) of same design and size.

However, we observed that the Tender Purchase Committee-I (TPC-I) of HVF recommended (June 2006) placement of the order on Gurgaon-based Firm 'A' on the basis of cost<sup>68</sup> ignoring the report of the Technical Committee that Firm 'A' did not have the experience in manufacture of such Radiators and the firm was in process of establishing the facility for manufacturing of such Radiator which was expected to commence by October 2006 only.

On the basis of the TPC-I recommendation HVF placed (July 2006) a supply order on Firm 'A' for 102 Radiators costing ₹2.28 crore with complete delivery by March 2008 in phases as under:

- Two Radiators as pilot samples within six months (January 2007) for Bulk Production Clearance (BPC)
- First batch of 50 Radiators within six months and second batch of 50 Radiators within 12 months of BPC

HVF received only one pilot sample of Radiator in June 2007 *i.e.* five months after the scheduled date. Based on the performance of pilot sample of

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<sup>65</sup> Indigenous manufacture of T-90 tanks (Tanks) at HVF is based on Transfer of Technology obtained (February 2001) from M/s Rosoboronexport, Russia.

<sup>66</sup> This radiator is plate and bar type against conventional tube type conforming to drawing No 188.31.082SB-1 consisting of water cooler, oil cooler housed in a fabricated framed structure.

<sup>67</sup> M/s. Perfect Radiators and Oil Coolers Private Limited, Gurgaon, now M/s. Lloyd Electric and Engineering Limited (Firm 'A'), M/s Teksons Limited, Mumbai (Firm 'B'), M/s Apollo Heat Exchangers Private Limited, Thane (Firm 'C') and M/s. Halgona Radiators Private Limited, Bengaluru (Firm 'D').

<sup>68</sup> Firm A had quoted ₹2.28 crore against the offer of Firm B for ₹3.79 crore

Radiator fitted on the tank, HVF issued BPC in January 2008 for manufacture of Radiator subject to elimination of certain discrepancies related to fitment of Radiator, raw materials *etc.* by the Firm.

Against the scheduled delivery of 102 Radiators by March 2008, the firm supplied 65 Radiators during February 2009 to July 2010 and did not supply any Radiator till December 2012. Meanwhile in October 2012, HVF decided to place order for additional quantity of 19 Radiators under option clause of the supply order of July 2006, thus increasing total quantity from 102 to 121 Radiators (₹2.80 crore) with PDC as October 2013. As the supplies even in respect of original quantity of 102 could not be completed within the stipulated schedule, PDC was extended up to February 2014 with Liquidated Damages (LDs). Supplies were completed by June 2014 and as of October 2014 payment amounting ₹2.58 crore was made to the firm after deducting LD.

We noticed that, by March 2013, 61 numbers of T-90 tanks fitted with the Radiators supplied by the firm were issued to the Army up to 31 March 2013. However, during Factory trials (2012) and Joint Receipt Inspection (JRI) (April/May 2013) of T-90 tanks produced by HVF using these Radiators, CQA<sup>69</sup> (HV) observed temperature of the coolant overshooting up to 120° C within short distance of 4 to 8 Kms. Based on the observations of CQA, HVF found some deviations from drawing and specifications which were not noticed during fitment trials before BPC and sent the Radiators back to the firm for rectification. However, during performance evaluation of rectified Radiators, the problem of temperature rising up to 120° C was again observed. In view of above, component level inspection and further tests were carried out jointly by HVF and CQA during the period from June to September 2014 in which non-conformances related to the manufacturing process, material and quality assurance were observed which were to be rectified by the firm. However, in subsequent JRI of T-90 tanks carried out in October 2014, problem of rising temperature up to 120° C still persisted. Based on detailed analysis, CQA confirmed that the Radiators were not meeting the stipulated technical requirements as per drawing and specifications and hence were not acceptable.

In view of non acceptability of the Radiators supplied by the firm and resultant hold-up in issue of T-90 tanks, Army HQ (MGO Branch) decided (November 2014) to pursue a multi-pronged approach *i.e.* procurement of Radiators through import from Original Equipment Manufacturer (OEM) on emergent basis and expedite indigenous manufacture of Radiators based on design of imported Radiator. It was further agreed (September 2015) by HVF to replace

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<sup>69</sup>Controllerate of Quality Assurance, (Heavy Vehicle), a quality assurance establishment under Director General of Quality Assurance (DGQA)

the non-compliant Radiators on 93 T-90 tanks held by them in batches by 31 March 2017 and thereafter on 61 tanks held with Army units.

Accordingly, HVF signed a contract (March 2016) with the OEM for import of 93 numbers Radiators at a cost of 69.40 lakh USD with PDC of December 2016. Out of 93 Radiators, 45 Radiators were received till December 2016.

As of December 2016, out of the 93 T-90 tanks held with HVF, 42 tanks had been replaced with the imported Radiators and were issued to the Army.

We also observed that while the quality deficiencies were under discussions with Quality Assurance Establishment, HVF had placed (July 2013) another order of 29 Radiators on the Firm 'A' at a cost of ₹1.27 crore, of which five Radiators were received (June 2016) against a payment of ₹20 lakh after deducting LD.

Thus, placement of purchase orders on a firm with no prior manufacturing experience in the required Radiators led to delay of about six years in supply. Subsequent failure of HVF in getting the defects of the Radiators rectified by the firm resulted in non-acceptance of T-90 tanks fitted with those Radiators by the Army. As a result, not only the entire expenditure of ₹2.78 crore by HVF towards procurement of 126 indigenous Radiators proved to be infructuous but issue of T-90 tanks to Army was also inordinately delayed impacting operational preparedness of the Armed Forces.

Ordnance Factory Board (OFB)/Ministry stated (April 2016/October 2016) that (i) order on Firm 'A' was placed on the ground that the Firm 'A' was in the process of establishing facilities for aluminium Radiators and would be able to make commercial production from October 2006; (ii) the Factory did not err in granting BPC since the pilot sample of Radiator was fitted in T-90 tanks for performance trial after its satisfactory performance in various tests and the T-90 tank fitted with the pilot sample of Radiator had completed 498 Km without any abnormality and the BPC was given to the Firm with a mention to eliminate certain discrepancies during bulk manufacture and; (iii) tanks were not issued not due to defect in design but due to insistence of the Army for fitment of imported Radiators with improved design.

The reply of OFB/Ministry is not convincing in view of the following:

- HVF had issued BPC based on the performance of pilot sample of one Radiator against the pilot sample of two Radiators, thereby deviating from the terms of the supply order.
- The BPC was issued subject to elimination of certain discrepancies relating to fitment of Radiators, raw material, *etc.* Since this firm did not



have prior experience, it was desirable to issue BPC only after adequate assurance that the deficiencies noticed during trial of pilot sample have been fully addressed.

- The CQA had stated (November 2014) that Radiators supplied by the firm were not meeting the stipulated technical requirements owing to the existing non-conformances related to manufacturing, material and quality assurance. Such observations by a quality assurance establishment also raises question on the tests conducted by HVF on the pilot sample before giving BPC.

## **7.6 Avoidable loss of ₹31.32 crore towards rejection of empty Fuze A-670M due to delay in defect investigation**

**Despite repeated failure in production of Empty Fuze A-670M in two Factories since 2008-09 onwards, OF Board constituted Joint team only in April 2014 which could give its recommendation in July 2016. Meanwhile, the production continued and empty Fuze A-670M valuing ₹31.32 crore were lying as rejected in two Factories as of July 2016.**

Fuze A-670M, a mechanical fuze used in 30mm BMP-II<sup>70</sup> ammunition, is being manufactured in Ordnance Factories since 1985 based on Transfer of Technology (ToT). Empty Fuze A-670M (fuze) is manufactured at Ordnance Factory Ambajhari (OFAJ) and Gun and Shell Factory Cossipore (GSF); the fuze is filled and the ammunition is assembled at Ordnance Factory Khamaria (OFK) and Ordnance Factory Badmal (OFBL).

Mention was made in Paragraph 4.7.5.1(b)(vii) of Report No. PA 4 of 2008 (Defence Services) regarding rejection of both empty and filled lots of Fuze A-670 valuing ₹18.31 crore during 2002-07. While accepting the Audit contention, Ministry in their Action Taken Note stated (March 2010) that necessary action would be taken to avoid losses in production of the Fuze A-670M in future.

In the follow-up audit (May 2016) we found that without addressing the quality aspects the production continued and 34 lots and 23 lots of fuze valuing ₹31.32 crore were rejected during 2008-16<sup>71</sup> at OFAJ and GSF respectively due to inconsistency in proof performance like premature functioning; blinds; and timing of self-destruction being lower than specified.

<sup>70</sup> Boevaya Mashina Pakhota-II (Original Equipment Manufacturer) of Russia, erstwhile USSR

<sup>71</sup> The rejection of filled fuzes were meagre: out of a total of 56 lots produced in 2011-16 at OFBL, two lots were rejected. Only one lot was rejected in OFK during 2011-16

We found that despite continuing rejections in 2008-16, the Board took over five years to initiate action for investigation into the reasons for failure of fuze. A Joint Team under the chairmanship of Additional General Manager/OFK was constituted in April 2014<sup>72</sup> comprising members of all the concerned Factories and their Quality Assurance Establishments. The Joint Team submitted its report after a further two years i.e. in July 2016 wherein quality problem in Spiral, Safety Lock Assembly (SLA)<sup>73</sup> and Cap-0541A had been identified as the most probable cause of rejection. We found that the cause of rejection was similar to the probable cause of rejection of fuze as pointed out in the earlier Audit Report.

The quality issues of fuze which have been hampering production of Fuze A-670M since long, had also adversely affected the production of the filled ammunition. The shortfall in meeting the targets of fuze and the ammunition over the last five years (2011-16) is tabulated below:

**Table-41**

Year	Shortfall in fuze (empty)		Shortfall in ammunition	
	As percentage of target	Value of shortfall (₹ in crore)	As percentage of target	Value of shortfall (₹ in crore)
2011-12	16	2.34	26	21.83
2012-13	51	9.50	15	13.94
2013-14	63	13.82	83	242.78
2014-15	72	13.15	55	71.14
2015-16	56	10.87	89	326.02

Meanwhile, due to shortfall in supply of empty fuze from OFAJ and GSF, OFK initiated import action of 3.82 lakh numbers of fuze at a cost of ₹35.19 crore for meeting the demand of the ammunition for the Services which had to be cancelled on the ground of non-acceptance of contractual conditions by the foreign firm.

We further analysed that based on the recommendation of the Joint Team (July 2016), proof firing of 15 lots manufactured with in-house SLA had given satisfactory results at Long Proof Range Khamaria. Controller of Quality Assurance (Ammunition) Pune agreed (July 2016) to conduct a GM's trial to ascertain the functioning of fuze upon replacement of in-house manufactured SLA and Spiral. However, the GM's trial was yet to be conducted as of November 2016.

<sup>72</sup> OFAJ also requested (December 2014) Defence Attache, Moscow to conduct a production process audit of hardware manufacture at OFAJ and filling and assembly at OFK through the OEM. But no response had been received from OEM as of July 2016.

<sup>73</sup> The SLA is a mechanical device in which the clip gets opened to allow the flash to pass through for ignition.

Thus, despite repeated failure in production of Empty Fuze A-670M in two Factories since 2008-09 onwards, OF Board constituted Joint team only in April 2014 which gave its recommendation in July 2016. Meanwhile, the production continued and empty Fuze A-670M valuing ₹31.32 crore were lying as rejected in two Factories as of July 2016. Further, inability to address quality issues in manufacture of Fuze A-670M by OFB with delays in initiating investigation and in identifying the exact causes for failure, led to shortfall in issue of critical ammunition to the Indian Army.

The matter was referred to the Ministry of Defence/Ordnance Factory Board (November 2016); their replies were awaited (January 2017).

### **7.7 Avoidable rejection due to failure to diagnose exact causes of earlier rejections**

#### **Failure of Ordnance Factories and the Quality Assurance Establishments in identifying exact causes of rejection resulted in continued rejection of lots of 105mm HE ammunition valuing ₹10.02 crore during 2013-16**

Ordnance Factories are responsible for ensuring quality of the ammunition manufactured while the Senior Quality Assurance Establishment (SQAE) positioned in the Factory premises, provides the overall quality assurance. In the event of heavy rejection or accidents, timely defect investigation is required to be carried out to identify the cause; suggest remedial action to make the rejected lot serviceable and such measures to prevent their recurrence in future.

105mm IFG HE ammunition is filled at Ordnance Factory Badmal (OFBL) and Ordnance Factory Chanda (OFCh). The two filling Factories rely<sup>74</sup> on Trade and Ordnance Factory Kanpur (OFC) for empty shells.

During 2010-11, four accidents were reported by Central Proof Establishment, Itarsi (CPE) during proof of filled 105 mm HE ammunition manufactured by OFBL, due to damage of the Muzzle brake<sup>75</sup>. A Task Force was formed (2011) with the representatives of the Factories, the SQAEs positioned in the Factory premises, the Controllerate of Quality Assurance (Weapon) (CQA/W) and the Proof Establishment, to investigate the accidents.

The Task Force took two years (February 2013) to conclude that the causes for the accident were rust inside the groove under the driving band<sup>76</sup>, dimensional

<sup>74</sup>In 2011-12, OFAj stopped production of empty shells for 105mm HE ammunition

<sup>75</sup>The muzzle brake of a weapon redirects and controls the burst of combustion gases that follows the departure of a projectile.

<sup>76</sup>The driving band made of metal that is pressed into the middle of the shell body.

difference in the driving band and inadequacies in its dynamic balancing (balancing of the shell in the barrel while firing). Among the remedial measures were phosphating of the shell before the driving band is pressed on it (to avoid rust); process controls at the stage of cleaning of the driving band groove and knurling operation prior to band pressing *etc.* An additional control point of dynamic balancing of the shell was also recommended.

The remedial measures recommended by the Task Force could not be implemented because it entailed changes in the process schedule (manufacturing process) for which the Controllerate of Quality Assurance (Ammunition) (CQA/A) did not grant approval. Instead the CQA/A directed the Ordnance Factories to follow the procedures as per the design documents of the OEM. Thus, the exact causes of rejection of the ammunition remained unresolved.

Meanwhile, production of 105 mm HE ammunition continued with the existing design of OEM. We found that four lots comprising 8009 numbers of Shell 105 mm ammunition valuing ₹10.02 crore manufactured at OFBL during July 2013 – July 2015, were involved in accidents during proofing at CPE Itarsi due to muzzle brake damage and premature functioning of rounds.

CQA/A identified (November 2015) that certain flaws were present in manufacturing of shells and fuzes either at empty stage or filled stage. They also highlighted that such high number of accidents at proof establishments not only damage scarce equipment but also endangers the lives of the personnel and as such immediate corrective actions are necessary.

In view of high numbers of accidents, CQA/A directed (November 2015) Ordnance Factory Board (OFB) to constitute a Failure Review Board (FRB) under the aegis of OFB with the representatives from concerned Factories and SQAEs to study, identify and pinpoint the cause of accidents and adopt remedial measures to arrest further production of defective ammunition. Accordingly, the Board directed (December 2015) OFBL constitute an FRB to study and pinpoint the cause of accident and adopt remedial measures.

The FRB constituted (January 2016) at OFBL to investigate and pinpoint the actual cause of defects, submitted its report in July 2016. However, FRB could not pinpoint or identify the exact reason of rejection but suggested for 100 *per cent* X-raying of the next few lots as a short term measure.

On being enquired in Audit, OFBL stated (March 2016) that since the major recommendations suggested by the Task Force did not pertain to OFBL, the remedial measures were not incorporated at OFBL.

Thus, while these accidents in proof firing at CPE, Itarsi reoccurred during July 2013-July 2015, the OFB as well as QAE are yet to diagnose the problem and take effective measures.

The matter was referred to the Ministry of Defence/Ordnance Factory Board (December 2016); their replies were awaited (January 2017).

## 7.8 Under utilization of costly machines

**Two tooled-up CNC machines were purchased at a total cost of ₹9.32 crore by Rifle Factory Ishapore despite already having an existing capacity to meet the targets. One tooled-up machine has been non-functional since July 2014 for want of special purpose tools (as of April 2016) and the prospect of utilization of the other machine engaged in production of two components is also bleak in view of procurement of these components from trade at a much cheaper rate.**

Rifle Factory Ishapore (RFI) manufactures 5.56 mm Indian Small Arms System Rifle. Three components of the weapon *viz.* Breech Block, Pawl Hammer and Extractor are manufactured in 36 machines in two production sections: CNC-II and Small Component (SC) section. Together these machines provide a capacity to manufacture 87,100 numbers of Breech Block at CNC-II section during 2010-11. Further, with the existing resources, Factory was able to manufacture 99,309 and 1,49,469 of Pawl Hammer and Extractor respectively.

The Factory projected (May 2010) a demand to replace four lathe machines of different sections<sup>77</sup> which had outlived their lives with two CNC machines under Renewal and Replacement grant for manufacture of these three components to enhance the capacity of 5.56mm Rifles from 60,000 numbers per annum to 80,000 per annum.

Ordnance Factory Board accorded (December 2010) the sanction and Factory placed (May 2012) an order on a foreign firm for two numbers of tooled up CNC Machining Centres for an amount of CHF 14.51 lakh. The delivery date for machines which were scheduled to be delivered by February 2013 was extended to June 2013 due to repeated change in composition of the pre-dispatch inspection team. The Factory received the machine valuing ₹9.32 crore in August 2013 which was erected and commissioned at the CNC-II and SC sections by the foreign firm in January 2014.

The machines procured were tooled-up machines which could be used only for the specific operations for which they had been tooled-up by the manufacturer.

<sup>77</sup> LC (two machines), MM and M (one each)

We observed that after commissioning, the two machines went under breakdown on several occasions between May 2014 and December 2014 and after intervention (December 2014) of the manufacturer, only one machine erected at SC section could be made operational. The other machine erected at CNC-II section was non-functional since July 2014 because the special tools recommended by the firm for proper functioning of the machine for manufacturing of breech block could neither be developed in-house nor procured from trade.

In March 2015, Factory decided to procure Pawl Hammer and Extractor from trade since the in-house cost of production of these components was not economical compared to trade cost. Accordingly, Factory procured 30000 and 62067 number of Pawl Hammers and Extractor respectively from trade during 2015-16 as it resulted in reduction of cost of production as well as increase in quality of components/products.

Thus, the procurement of the two CNC machines was flawed since the factory was having existing capacity to meet the futuristic targets and also these machines were not put to use for manufacturing of components of Rifles.

On being enquired in Audit, Ordnance Factory Board stated (April 2016) that the machines were procured for replacement of four condemned lathe machines which was in line with the goal to induct new machines with advance technology which can enhance productivity as well as futuristic load. It was also stated that the new machines are also being utilized for manufacturing of the components for newly developed weapons.

The Board's contention is not convincing since:

- The production sections: CNC-II and SC sections already had the capacity to manufacture Breech Block, Pawl Hammer and Extractor to meet the futuristic demand of 80,000 numbers of 5.56 mm Rifle per annum and thus, additional capacity was not required in the Factory;
- In-house production cost vis-à-vis trade cost of the components (Extractor and Pawl Hammer) was not assessed at the time of placement of demand for the CNC machines as these components are available from trade sources at cheaper rate;
- Old machines were disposed off (March 2011) 34 months prior to the commissioning of new machines in violation of Procurement Manual for Plant and Machinery which stipulates that old machines should be disposed off only after the receipt of their replacements;

- The demand for 5.56mm Rifle has been on a steady decline since 2012-13 because the Army's demand has been saturated and;
- Utilization of the new machines for manufacturing of components for newly developed weapons is not possible since the new machines were not general purpose machines but procured under tooled-up conditions, designed for manufacturing of only specific components.

Thus, two tooled-up CNC machines were purchased at a total cost of ₹9.32 crore by Rifle Factory Ishapore despite having existing capacity to meet the targets. One tooled-up machine is non-functional since July 2014 for want of special purpose tools (as of April 2016) and the prospect of utilization of the other machine engaged in production of other two components is also bleak in view of procurement of these components from trade at a much cheaper rate. Audit recommends that the OFB may explore if these CNC machines can be re-tooled and put to use in other shops/ factories.

The matter was referred to the Ministry of Defence (September 2016); their reply was awaited (January 2017).

## 7.9 Delay in production of BLT variant of Tank T-72

**As per Indent, T-72 Bridge Laying Tanks (BLT) variants were scheduled to be delivered by HVF, Avadi in a phased manner during 2012-2017. On account of delays in execution of infrastructure projects and frequent changes in the sealed design of T-72 BLT, HVF was yet to commence issue of T-72 BLT variant and the advancing tank column of the Armoured Regiments, therefore, remained incomplete to that extent.**

An advancing tank column of an armoured regiment comprises the fighting tanks with the weaponry along with its variants, *i.e.*, tanks which provide support services to the main tank. The variants include Bridge Laying Tanks<sup>78</sup> (BLT) which are used to lay short span bridges over canals and other obstacles to enable the movement of main tanks. Indian Army has been holding BLT on old T-55 tanks, which have since outlived their life.



<sup>78</sup>The BLT is essentially a tank without the weapon control system or the turret, but with a bridging system that is attached to the chassis. The carrier vehicle of a BLT is modified to equip it with hydraulic systems and fit the bridging system.

With the indigenisation of Tank T-72 in 1993 and taking cognizance of the need to upgrade the corresponding variants, Army projected (2007) a requirement of 381<sup>79</sup> variants of T-72 tanks which included 147 BLT variant. To meet this requirement the Ordnance Factory Board (Board) in turn felt a need to augment its infrastructure and procure fresh machinery and equipment for production of the BLT. The Board accordingly prepared a Detailed Project Report (DPR) in 2009, which *inter-alia* determined the critical timelines for all the activities leading to eventual phased roll out of the BLT. Combat Vehicles Research & Development Establishment (CVRDE), Avadi under Defence Research and Development Organisation (DRDO) was the agency responsible for design and development of the BLT variant. The Ministry placed an indent for Army in February 2010 for 135 BLTs<sup>80</sup> on the Board, scheduled for phased delivery during 2012-2017. In August 2010, creation of production facilities at the Heavy Vehicles Factory, Avadi (HVF) at a total cost of ₹280 crore<sup>81</sup>, was sanctioned by the MoD, which included procurement of machinery and equipment worth ₹199 crore. As of September 2016 a total expenditure of ₹190 crore including civil works has been incurred.

We observed that the project for manufacture and issue of 135 BLTs to the Army was severely lagging behind. Delays were mainly attributable to tardy procurement of machinery and equipment by the factory and non-freezing of designs by CVRDE, which led to failure in achievement of objectives of the ₹280 crore project. The issues leading to delay are discussed as follows:

- **Slow procurement of Machinery and Equipment**

As per the DPR, placement of orders for machinery like CNC Turn Mill Centre, Boring and Milling machine, Gear Shaping machine, Laser Cutting machine, *etc.* and equipment like Forklift, Drilling machine, Welding machine, Battery Operated Truck, Crane, *etc.* were required to be completed by August 2011 and their commissioning was required to be accomplished by February 2013. Meanwhile the sealed design was received by the Factory in June – September 2011.

There were delays at both the pre and post contract award stages. We found that the factory could not place the order within the scheduled time and the orders for machinery and equipment were issued even in September 2016. It was further seen that within the stipulated time of August 2011 not a single order was placed by the factory. Even as of September 2016 *i.e.* five years after the targeted time, the orders for four items including one critical machine (CNC machine for production of Torsion Bar) were yet to be placed.

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<sup>79</sup> 147 BLTs, 160 Tanks for Trawls and 74 Flails

<sup>80</sup> 12 BLTs under Limited Series Production sent to the Army in 2006-07 by DRDO

<sup>81</sup> Ministry's sanction (August 2010) was for BLT and Tanks for Trawls. No separate money value for BLT project was available.



The delay in placing of supply order was further compounded by the delays in execution of supplies by the suppliers. Our examination of 50 sampled machinery and equipment out of total 101 required, revealed an average delay of 26 months (with the range between 11 and 46 months) in placement of orders<sup>82</sup> which was mainly due to inordinate time taken for technical evaluation of the tenders and negotiation with vendors.

In post-contract phase, there was a delay of two to 15 months in receipt of 14 machines and equipment. We found that these delays were attributable to delay in deputing pre-dispatch inspection (PDI) team by the factory and non-compliance of modification by the suppliers as suggested by PDI team. In addition, there were delays of two to 14 months<sup>83</sup> in commissioning of 12 machines by the suppliers.

The Ministry stated (June 2016) that considerable time was taken for procurement, receipt and commissioning of machines/equipment due to delay in framing of machine specification, teething problem in e-procurement system, delay in deputing PDI teams due to exigency in workload, paucity of funds and non-availability of vessels for shipment of imported machines.

The contention of the Ministry is, however, not tenable as we instead found that the delays were compounded due to inordinate time taken for technical evaluation of the tenders and negotiations with vendors. Further, the bottlenecks in deputing PDI teams, framing of machine specifications and other logistic arrangements could have been avoided by efficient project planning and procurement action.

Thus, the action for procurement of machinery and equipment was tardy which was mainly impaired by delay in placement of orders and also in commissioning of the equipment. Consequently, the Board could not produce and commence the supply of BLTs even by September 2016.

- **Frequent changes in sealed design and drawings**

Mention was made in Report No. 35 of 2014 of the Comptroller and Auditor General of India about frequent changes in the designs leading to delay in development of Tank (MBT Arjun). Ministry in their reply (December 2015) to Public Accounts Committee's (PAC) questionnaire about the mechanism/system for freezing of design of the newly developed items stated that complete configuration management system exists with Defence Research and Development Organisation (DRDO) and the developed product is

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<sup>82</sup>With reference to the prescribed time limit of six months for placing orders after sanction

<sup>83</sup>In absence of specific timeframe for commissioning of machines in the supply orders, six months time was considered for commissioning of machines as adopted in the earlier Audit Reports.

normally trial evaluated extensively for complete operational satisfaction of the User before placing indent. It was clarified that the configuration is to be frozen after trial evaluation and only very critical changes are to be requested through existing 'Alteration Committee' mechanism. The Alteration Committee comprising members of the Factory, CQA, DRDO, User is responsible for suggesting changes/improvement in manufacturing process and materials in course of bulk production of established items, wherever required because of quality problems.

Notwithstanding the procedure explained by the Ministry to the PAC, we observed that while HVF was provided the sealed design drawings<sup>84</sup> in June-September 2011, the amendments to the drawings (e.g. major amendments in respect of Hull manufacturing, Radiators, etc.) continued even up to September 2016. In all, 757 amendments were made to the approved drawings by the DRDO and Controllerate of Quality Assurance (Heavy Vehicles) [CQA(HV)] by March 2013.

Even as late as December 2014, the designs on certain assemblies/components were amended. It was reported by HVF in Production Review Meeting (March 2013) that DRDO was amending the designs in the production shop itself without intimating the feeder sections. These changes in designs not only resulted in mismatch in the components and tools procured or manufactured but also had financial implications caused by cancellation of supply orders placed on the basis of previous designs. The Ministry further intimated (November 2015) that amendments in drawings from time to time by DRDO resulted in delay in receipt of sealed drawings and amendments to the sealed drawings were still being received.

In response to an Audit query about the reasons for frequent changes in the sealed design, CQA (Heavy Vehicles) Avadi intimated (January 2015) that amendments were issued by DRDO to incorporate improvements necessitated by production constraints and hence, the drawings could not be frozen.

Ministry in June 2016 agreed to the Audit contention and stated that continuous amendments in drawings by CVRDE and time taken in resolving the major issues relating to design/inspection methodology/ refinements had hampered the pace of progress of manufacturing BLT.


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<sup>84</sup> The drawing designs are to be given by the developer, DRDO in a sealed cover to the representative of the Directorate General of Quality Assurance *i.e.* Controllerate of Quality Assurance Establishment, Heavy Vehicles (CQA (HV)).

## Conclusion

The production of the BLT variant has been hindered on two fronts. Lack of effective coordination amongst all the stakeholders in resolving the issue of amendment of sealed design during bulk production stage over a period of five years has resulted in delay in production. This is compounded by the delays in procurement and commissioning of machinery and equipment by the Factory. These factors have deprived the Armoured Regiment of Army of a major capability for its advancing Tank column in replacement of the current holding of BLTs on obsolete T-55 Tanks.


New Delhi  
Date: 23 March 2017



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Director General of Audit  
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Countersigned

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Date: 24 March 2017



(SHASHI KANT SHARMA)  
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