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# **INTRODUCTION**

# 1. INTRODUCTION :

- 1.1 The Works and Administrative office of Chittaranjan Locomotive Works (CLW) are located at Chittaranjan, Dist. Burdwan in West Bengal. In addition, there is a Stores Purchase office in Kolkata and CLW's inspection cells in New Delhi, Mumbai, Kolkata and Bangalore.
- 1.2 Chittaranjan Locomotive Works (CLW) is the first industrial gift to free India by the planners of this nation. The issue of setting up a locomotive building unit continued to be under active consideration of the Central legislature and in the late thirties, a committee consisting of M/s Humphries and Srinivasan was appointed to investigate the possibility of establishing a locomotive manufacturing unit and to consider its economic viability. The initial project at Chandmari, a place near Kanchrapara in the state of West Bengal, could not mature due to partition, which inevitably necessitated a change of site. The present site of Chittaranjan was selected after a fresh survey and Railway Board's approval was obtained in the year 1947. The locoworks was initially established for production of 120 average sized steam locomotives with the capacity to manufacture 50 spare boilers. Production of steam loco commenced on 26<sup>th</sup> January, 1950. The first President of India, Dr. Rajendra Prasad dedicated the first steam locomotive to the nation on 1<sup>st</sup> November, 1950 and on the same day the factory which was called Locomotive Manufacturing Works, was named after the great Patriot, Deshbandhu Chittaranjan Das. Production of Diesel Locomotive was taken up during 1968. After manufacturing 2351 Steam Locomotives of 5 types and 842 Diesel Locomotives of 7 types, production of Steam and Diesel Locos were discontinued from 1971-72 and 1993-94 respectively. CLW is now manufacturing main line Electric Locomotives only. Upto 31.12.13, 5132 Electric Locomotives have been produced of different class (AC/DC, AC, DC & 3- phase).
- 1.3 CLW has augmented its production capacity for Electric Locos in phases besides absorbing 3-phase technology i.e from 60 to 80 Locomotives, 80 to 100, 100 to 130 and 130 to 150.
- 1.4 Production of Traction Motors and control equipment commenced in April 1967. In the year 2012-2013, 1537 TM were produced.
- 1.5 Steel Foundry was set up in 1962-63 for production of steel castings for Steam Locomotives produced in CLW. It took up production of castings with the State of the Art technology provided M/S Rockwell International Corporation, USA in the year 1990-91.
- 1.6 CLW has in house facilities for machining and assembly of wheel sets, fabrication and machining bogies. The facilities include modern CNG machines, Plasma Cutting machines, Inert Gas Welding etc.
- 1.7 CLW has an exclusive Centre for Design and Development with CAD/CAM facilities.
- 1.8 There is a well-established quality assurance/inspection for incoming material and stage inspection and final inspection of the CLW manufactured items.
- 1.9 CLW has been sanctioned "Creation of additional facilities for enhancement of production capacity".  
The major works are:
  1. Additional Bay of Loco Fabrication Shops.
  2. Extension of Traction Motor Shops.
  3. Additional Machinery & plant, Tools, jigs & fixture.
  4. Production control Information Management System.
  5. Augmentation to various Ancillary Shops.
- 1.10 CLW has acquired the ISO-14001 certificate on 26.4.2002 both for its works and township for a neat and clean environment.
- 1.11 Chittaranjan is a true example of Environment preservation and consciousness. Its lush green ambience talks of the efforts of the Administration as well as the residents of the township in the conservation of Environment, as well as using of all the existing natural resources in an eco-friendly manner. The concerted and unending efforts have been rewarded immensely by the World Environment Foundation and **the Golden Peacock award for Environment Management 2006 had been conferred on 9<sup>th</sup> June 2006.**

1.12 CLW has complied fully with the provisions of the Industrial Safety Act, 1948. CLW in its safety policy aims to ensure 100% safety for all workers working in Chittaranjan Locomotive Works. CLW is the proud recipient of the Safety innovation award 2006. The award was conferred on CLW on 6<sup>th</sup> September, 2006 by the Safety and Quality forum of the Institute of Engineers (India).

1.13 The 2<sup>nd</sup> IGBT technology based WAG-9i Class Freight loco No. 31234 has been successfully commissioned on 15<sup>th</sup> April, 2010. The first electric locomotive (WAP-7 type no. 30277) with Head on Generation (HOG) scheme was flagged off on 30<sup>th</sup> June, 2010.

1.14 The first WAP-7 loco no. 30279 was produced with brake rigging of WAP-7 design.

**1.15 Inauguration of e-Auction in CLW.**

E-Auction was started in Chittaranjan Locomotive Works (CLW) on 24-01-2013. Shri Radhey Shyam, General Manager, CLW inaugurated this system with the mouse click on the CLW Website. This is the first time that e-auction process was started in CLW. This has conducted the e-auction process online through the IREPS (Indian Railways Electronic Procurement System) website of Indian Railways.

**1.16 All India Railway Bridge Championship in CLW.**

The 35<sup>th</sup> All India Railway Bridge Championship, 2012-13 got underway at Chittaranjan Locomotive Works on 05-03-2013. A total of 38 participants from ER, SER, Metro, CR and CLW were participated in this all India level competition which was continued up to 8<sup>th</sup> March. Top ranking national level players vied for top spots in three different events, namely Swiss Event for team championship, Pairs and Board A match.

**1.17 Installation of PCMIS Facility in CLW**

In another successful attempt to modernize its day-to-day activities, Chittaranjan Locomotive Works (CLW) has installed PCMIS package recently, during March 2013. This facility will revolutionize procurement and updating procedure in CLW. The package was handled by EDP Centre/CLW and developed by Ms. CMC Ltd.

**1.18 CLW'S ALL TIME HIGH RECORD LOCO DISPATCH**

Chittaranjan Locomotive Works (CLW), the premier electric loco production unit of Indian Railways, has achieved ever highest production of 270 locomotives in the year 2012-13. Thus not only surpassed the Railway Board's target but also last year production figure of 258 locomotives, which was so far the best ever annual production in the history of this unit. CLW has made quantum jump in production of 3-phase electric locomotives from 76 nos in 2011-12 to 110 nos in 2012-13, an increase of 45% over last year.

**1.19 Celebration of Kaviguru Rabindra Jayanti in CLW.**

The Birth Anniversary of Kavi Guru Rabindra Nath Tagore was celebrated on 9<sup>th</sup> May 2013 at the Chittaranjan Club in Chittaranjan Locomotive Works. Shri Radhey Shyam, General Manager/CLW paid floral tribute on the portrait of Kavi Guru and inaugurated the programme by lighting the traditional lamp as Chief Guest.

**1.20 Inauguration of Ventilator Machine and distribution of hearing aids in KG Hospital /CLW.**

A ventilator machine was inaugurated by Shri Radhey Shyam, General Manager/CLW, in the Kasturba Gandhi Hospital of Chittaranjan Locomotive Works (CLW) on 24-06-2013. On the occasion, some hearing aids were distributed to the needy patients of CLW by Shri Radhey Shyam, General Manager.

**1.21 CELE's Coordination Conference in CLW.**

An one day co-ordination meeting on customer feedback was held at Chittaranjan Locomotive Works (CLW) on 29<sup>th</sup> June, 2013 amongst the Chief Electrical Loco Engineers (CELEs) & Sr. Divisional Electrical Engineers (Sr. DEEs) of ten (10) participating railways to discuss how to improve the reliability of the CLW built 3-phase electric locomotives. The meeting was formally inaugurated by Shri Radhey Shyam, General Manager, CLW on 29<sup>th</sup> June, 2013 in the Administrative office meeting room.

### **1.22 Best ever production performance in first quarter.**

Chittaranjan Locomotive Works( CLW), a premier electric loco production unit of Indian Railways, has excelled in loco production by rolling out an all time high latest technology electric locomotives in its first quarter of 2013-14. Overall loco production has witnessed a quantum jump of about 25 % in the first quarter of current financial year 2013-14 in comparison to same period of 2012-13 . CLW has been able to produce a total of 69 electric locos in the said period of this fiscal in comparison to 55 locomotives in 2012-13 . The production of three-phase locomotive was only 11 during the first quarter of 2012-13 and it has crossed 27 in the same period of 2013-14 and thus recorded a leap of about 150 %.

In another development , CLW has also improved the production of traction motors, for providing motive power to the locomotives. In the first quarter of 2013-14, about 30 % increase has been recorded in the production of three-phase traction motors as it has produced 228 TMs in this quarter in comparison to 175 of the corresponding period of last year..

### **1.23 inauguration of new CNC Vertical Torret Lathe Machine**

In order to enhance the production capacity of Wheel Shops in Chittaranjan Locomotive Works (CLW), a CNC Vertical Turret lathe machine was commissioned and inaugurated by Shri Radhey Shyam, General Manager / CLW on 17-07-2013 inside the workshop. This machine, installed at a cost of Rs.4.16 crores, will help in enhancing the production of wheel assembly for more electric locomotive production from CLW.

### **1.24 inauguration of new Auto-Analyzer Machine in KG Hospital/CLW**

An Auto Analyzer machine was inaugurated by Shri Radhey Shyam, General Manager/CLW, in the Kasturba Gandhi Hospital premises of Chittaranjan Locomotive Works (CLW), on 17-07-2013. It is expected that, this machine which is installed at a cost of Rs.10 lakhs., will help in getting the auto analysed blood test reports of CLW employees and their family members. It is to be noted that, the KG Hospital is adapting newer technology in providing better health services to the inhabitants of CLW.

### **1.25 Production & flagging off of 100<sup>th</sup> Locomotive of the year 2013-14 in CLW.**

The 100<sup>th</sup> Electric Locomotive of the year 2013-2014 of Chittaranjan Locomotive Works, bearing no.312410 ( WAG-9H) was inaugurated and dedicated to the service of the Nation on 14-08-2013 by Sri Radhey Shyam, General Manager, CLW in a simple ceremony held inside the workshop. It is worth mentioning here that CLW produced 100 electric locomotives in this year in comparison to the 83 electric locomotives produced during the corresponding period of last year.

### **1.26 VISIT OF MEMBER ELECTRICAL , RAILWAY BOARD TO CLW**

Shri Kul Bhushan, Member Electrical, Railway Board & Ex-Officio Secretary to Govt. of India visited Chittaranjan Locomotive Works (CLW) on 9<sup>th</sup> Sept 2013 . During his visit to the workshop, Multi operation high speed 3 - phase passenger locomotives of WAP-5 type bearing loco no. 30069 & 30070 were ceremonially flagged off by Shri Kul Bhushan , Member Electrical & Shri Radhey Shyam , GM, CLW for inclusion in the fleet of Indian Railways .

Shri Kul Bhushan also inaugurated a Newly built Shed in Test shop under AP-275 project at a cost of Rs 3.47 crores to accommodate more locomotives and a CNC Universal Machining Centre inside Heavy Machine Shop for complete machining of 3-phase stators at a cost of Rs 10 crores .

**1.27 Cultural Festival “ AAROHAN 2013 “ In Chittaranjan**

A Cultural Festival named “AAROHAN 2013” was organized by the Chittaranjan Locomotive Works Cultural Association ( CLWCA) on 4<sup>th</sup> & 5<sup>th</sup> Nov 2013 at Rabindra Manch premises ..

**1.28 4<sup>th</sup> All India Railway Archery Championship 2013-14 in CLW.**

The 4<sup>th</sup> All India Railway Archery Championship 2013-14 was held at the Oval Ground on 18<sup>th</sup> December 2013. Shri Gurdev Singh, Financial Adviser and President, CLWSA inaugurated the meet as Chief Guest. This Championship lasted till 20<sup>th</sup> December comprising of Events of both Men & Women categories. The participating teams includes DMW/Patiala, S.C.Railways, N.F.Railways, E.Railways, S.E.C.Railways and CLW/Chittaranjan being the host team. The Championship was organized in six categories namely; Recurve Men, Recurve Women, Compound Men, Compound Women, Recurve Men Individual and Recurve Women Individual.

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## SALIENT FEATURES

## 2. SALIENT FEATURES

Salient features of CLW w.r.t the following :

### 2.1 Total turn over as on 31.12.13

- a) For Indian Railways : Rs.2303.86 Crores  
b) For others : --

Turn over ratio as on 31.12.13 – (-)17%

### Break up of Turnover as on 31.12.13

Supply of Locos including TOT	Rs. 2051.34 Crores
Components manufactured for stock	Rs. 241.44 Crores
Supply of Spares for Zonal Railways	Rs. 11.08 Crores

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TOTAL Rs: 2303.86 Crores

Turn over ratio of Store Deptt./CLW for 2012-13 upto Dec013 : 55.56%

### 2.2 Total assets : (as on 31.12.13 ) : Rs. 725.90 crores

- a. **Fixed assets: (as on 31.12.13 )** : Rs. 318.68 crores  
A) Township : Rs.27.37 crores  
B) Workshop with M&P : Rs. 291.31 crores  
b. **Floating assets (as on 31.12.13 )** : Rs. 407.22 crores  
A) Stores : Rs. 843.16 crores  
B) WMS : Rs. (-) 454.45 crores  
C) Misc Adv. : Rs. 18.51 crores

### 2.3 Sanctioned and on-roll position of staff as on (01.01.2014) group of staff wise i.e Group A, Group B, Group C & Group D.

Group	Sanctioned Strength	On Roll
Group A	240	104
Group B		79
Group C	11835	9469
Group D	3144	2807

### 2.4 Elec. Power requirement (average maximum demand) : 11MVA

### 2.5 Electric energy consumption : (in lakh units/year) : 456.70194 Lakh unit (from 1<sup>st</sup> January,2013to 31<sup>st</sup> December 2013.

### 2.6 No. of H.T. Sub station:

A) 33/11 KV :01 no.  
B) 11/3.3KV : 01no.  
C) 11/0.4KV : 45 nos.  
D) 11/0.4KV : 21 nos.- under main shop.

### 2.7 Stand by power generation capacity(in KW) : 8037.50 KWH(as on 31.12.2013)

### 2.8 Water consumption (in lakh litres/Day) : 150 Lakhs/lit./Day

### 2.9 Workshop Land(In hectares) : 100.44 Hectares.

### 2.10 Township area : 1834.441 Hectares.

### 2.11 (a) Covered area in shops (in SQM) : 239843 SQM

### (b)Covered area of other service building (in SQM) : 35241 SQM

### 2.12 (a)Total staff as on 31.12.13 : 12276 Nos.

### (b)Total number of staff quarters : 9346 Nos.

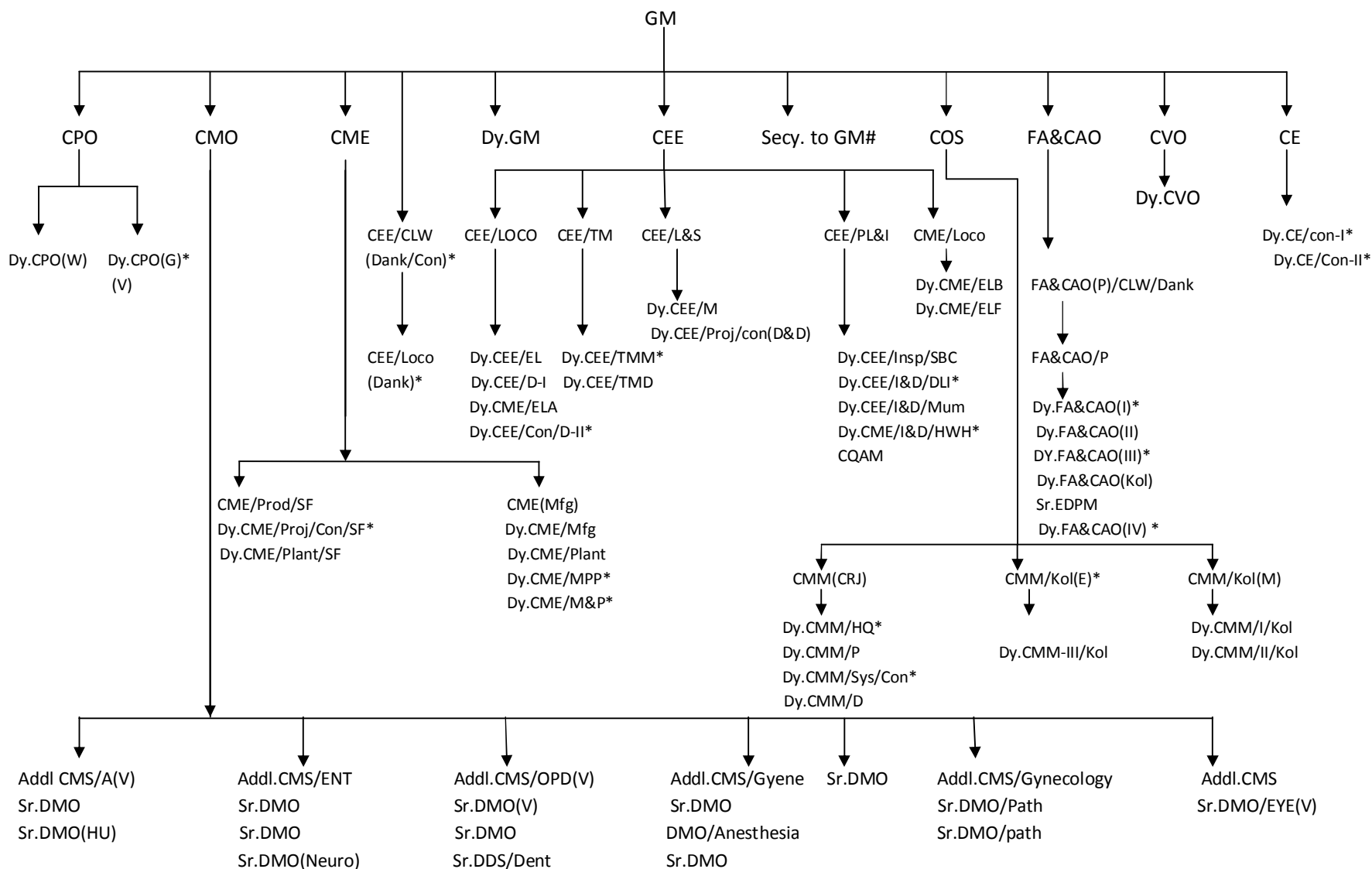
### 2.13 Hospital (no. of beds) : 197 Nos.

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# **ORGANISATIONAL CHART**



# ORGANISATIONAL CHART (UPTO JAG) AS ON 01.01.14 .



Note: - # (Elect. Cadre) \* (W/C) V- Vacant.

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# **PRODUCTION PERFORMANCE**

## 4. PRODUCTION PERFORMANCE :

CLW built 2351 Nos. of Steam Locomotives and 842 Nos. of Diesel locomotives before switching over completely to the production of Electric Locomotives. The last Steam Locomotive was built in the year 1971-72. The production of Diesel locomotives continued up-to 31<sup>st</sup> March 1993 when the last ZDM-5 Narrow Gauge Loco was turned out. Now CLW is involved in the production of Electric Locomotives (Conventional and Three phases) and has produced 5132 Electric locomotives till 31<sup>st</sup> Decø2013and maintenance spares required by Zonal Railways. The annual out-turn of various types of Locomotives CLW has produced since inception is given in the Annexure-V in two sheets.

### 4.1 **ELECTRIC LOCOMOTIVES :**

The production of Electric Locomotives was started in the year 1961. Till 31<sup>st</sup> Decø 2013, 5132 nos Electric Locomotives of various classes and traction have been produced as shown in the Annexure-III in two sheets.

The present production of electric locomotives consists of:

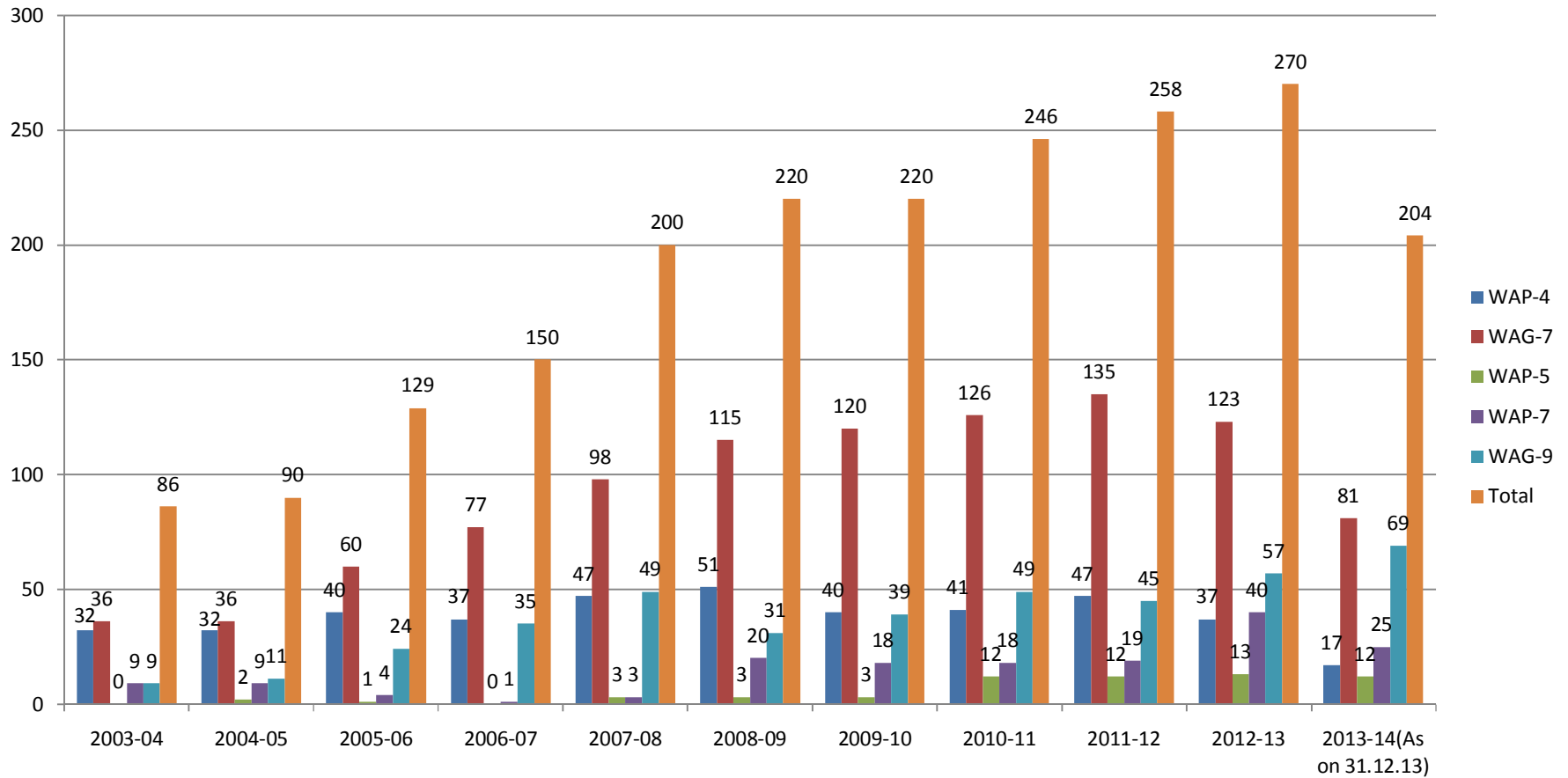
- i. 5000 HP 6-axle freight Loco (WAG-7) with fabricated bogies (High Adhesion) and secondary suspension with axle load of 20.5 Ton suitable for air brake trailing stock
- ii. 5000 HP, 6 Axle AC Passenger Traffic Locomotives (WAP-4) fitted with Flexi-coil cast steel bogies and Axle load of 18.8 Ton hauling Rajdhani Express and other Super Fast trains.
- iii. 3-phase AC Thyristor controlled 6000 HP, 6 Axle freight WAG-9 H (with an Axle load of 22.5 Ton).
- iv. Passenger version of 3-phase loco viz. WAP-5 with an axle load of 19.5 ton having Micro processor controlled Brake system for hauling Mail/Express and other Super fast trains.
- v. Passenger version of 3-phase Loco viz. WAP-7 with an axle load of 20.5ton having Microprocessor controlled Brake system suitable for hauling Mail/Express and other super fast trains.

During the year 2012-13 CLW has manufactured 37 nos. WAP-4, 123 nos.WAG- 7, 57 nos.WAG-9, 13nos.WAP-5 and 40 nos. WAP-7 Electric Locomotives i.e. total 270nos. Locomotives against planned yearly out turn of 273 Electric Locomotives (As per JPO-59, dt. 09.01.2013). CLW has planned to produce 275 nos Electric Locomotives during the year 2013-14 & 280 nos Electric Locomotives during the year 2014-15(As per JPO-63, dt.1.2.14).

4.1.1 Year wise production from 2000-01 to 2013-14 vis-à-vis production programme as said by the Railway Board are as under:

<b>YEAR</b>		<b>WAP-4 (RAJ)</b>	<b>WAG-7 (HH)</b>	<b>WAP - 5 (TP)</b>	<b>WAP-7 (TPP)</b>	<b>WAG-9 (TG)</b>	<b>Total</b>
2000-01	Target	45	67	2	1	5	120
	Actual	50	62	2	1	5	120
2001-02	Target	37	50	-	1	2	90
	Actual	34	40	-	2	6	82
2002-03	Target	20	24	4	9	12	69
	Actual	28	27	1	6	7	69
2003-04	Target	32	39	-	9	6	86
	Actual	32	36	-	9	9	86
2004-05	Target	30	35	-	13	12	90
	Actual	32	36	2	9	11	90
2005-06	Target	39	56	4	2	27	128
	Actual	40	60	1	4	24	129
2006-07	Target	37	77	1	-	35	150
	Actual	37	77	-	1	35	150
2007-08	Target	47	98	3	3	49	200
	Actual	47	98	3	3	49	200
2008-09	Target	51	115	4	20	30	220
	Actual	51	115	3	20	31	220
2009-10	Target	40	120	5	20	45	230
	Actual	40	120	3	18	39	220
2010-11	Target	35	95	15	30	55	230
	Actual	41	126	12	18	49	246
2011-12	Target	30	100	15	30	55	230
	Actual	47	135	12	19	45	258
2012-13	Target	20	100	15	40	75	250
	Actual	37	123	13	40	57	270
2013-14 As per JPO-61, dt. 16.7.13(As on 31.12.13)	Target	20	92	15	50	98	275
	Actual	17	81	12	25	69	204

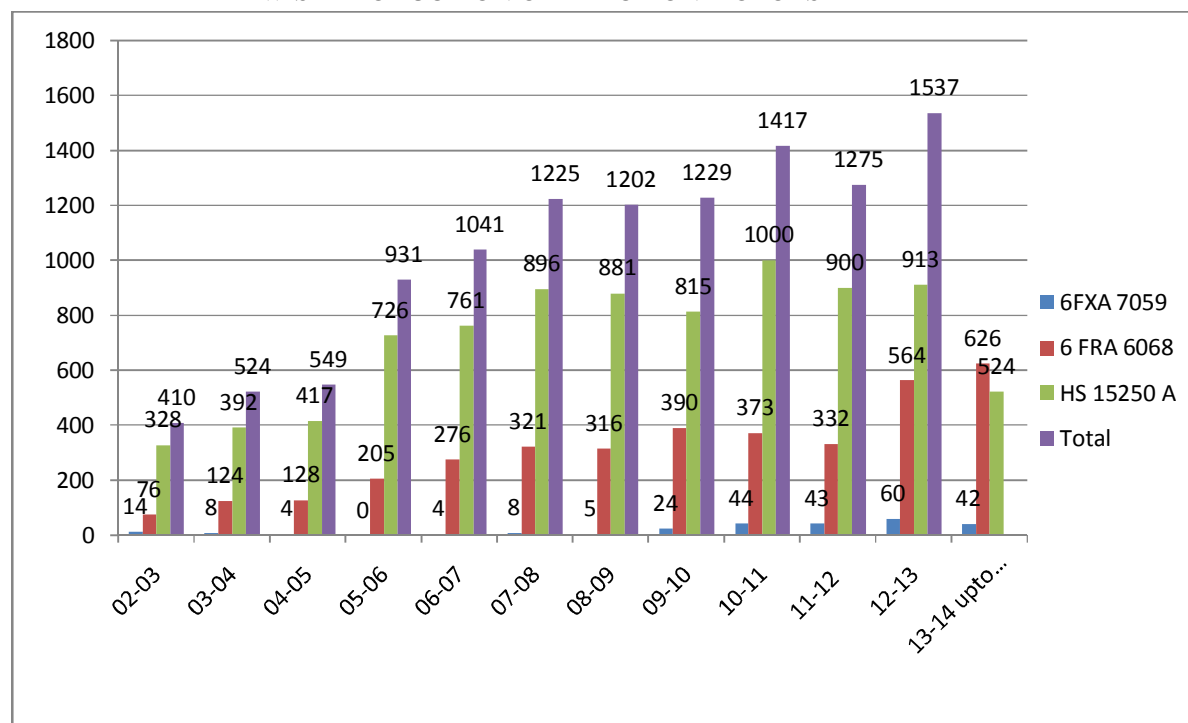
Year wise Electric Loco production from 2003-04 to 2013-14(As on 31.12.13)



## 4.2 TRACTION MOTORS:

4.2.1 Cumulative production of Traction Motors during the year 2013-14 upto 31.12.13 has been 1192 Traction Motors (524 Hitachi & 668 Three Phase). Yearwise production of Traction Motors is given at Annexure-II.

YEARWISE PRODUCTION OF TRACTION MOTORS



### 4.2.2 STATIC EQUIPMENT:

Static equipment are required for manufacture of conventional locomotives (WAG 7/ WAP4)

The production of Static Equipment during 2013-14 was 80 loco sets + Rly. Spare demands.

Details of various items of Static Equipment (Quantity in number) manufactured during the year 2013-14 up to 31.12.13 is shown below:

Item Description	Qty. (No.)	Item Description	Qty. (No.)
Motor Contactor (MC)	306	Traction Braking Switch (CTF-1,2&3)	114
Shunting Contactor (SC)	872	Master Controller (MP)	89
Electro Magnetic Contactor (EMC)	270	Smoothing Reactor (SL)	96
Braking Excitation Contactor (C145)	51	Inductive Shunt (SJ)	157
Reverser (J)	79		

Year wise production of various static equipments from 1972-73 onwards are given in Annexure III

#### 4.2.3 SUPPLY OF SPARES :

The following materials were supplied to zonal Railways as spares during the year 2012-13 up to 31.12.13 against their sanctioned RSPS/vetted indents.

Item Description	Qty. (No.)	Item Description	Qty. (No.)
Hitachi Traction Motor	108	3 Phase Traction Motor (Co Co)	16
3phase Rotor SCH-I (Co-Co)	02	Smoothing Reactor (SL)	6
3phase Rotor SCH-II(Co -Co)	11	Hitachi Armature shaft	25

#### 4.2.4 IMPROVEMENTS TO ENHANCE RELIABILITY:

To improve reliability and performance, modifications as listed below have been implemented during 2013-14 up to 31.12.13.

##### 4.2.4.1. THREE PHASE TRACTION MOTOR TYPE 6FRA 6068 :

- To arrest the failure of Bearing seizure, looseness of Inner bearing labyrinth (stopper) inside End frame (DE & NDE), the interferences between components has been revised vide RDSO Modification sheet No.RDSO/2012/EL/MS/0415(Rev.0) dated 30.10.12. All drawings of the relevant components have been modified and implemented accordingly.
- To arrest the failure of speed sensor, in-house test facility of speed sensor with installation of CRO arrangement has been implemented.
- For redundancy, specification of speed sensor has been modified incorporating completely another independent channel such that incase of any failure in one channel, other channel will remain active.
- Grease escape hole in End frame (NDE) of phase TM type 6FXA 7059 has been incorporated in drawing and referred to RDSO for approval.
- Specification of temperature sensor has been revised so as to get complete integrated unit from trade avoiding soldering defects.

##### 4.2.4.2 HITACHI TRACTION MOTOR TYPE HS-15250A :

- To reduce the amount of counter weight in balancing the Armatures, dynamic balancing of Armature stack (before winding) with commutator and correction thereafter has been started.
- To maintain the specified depth(2 to 2.5mm) of mica undercutting of commutator, the process of diamond turning before mica undercutting has been started.

##### 4.2.4.3 INNOVATIONS & DEVELOPMENTAL WORK IN T.M . SHOPS :

- During 2013-14, CLW has switched over to scheme 6 I/II rotar manufacturing from V2 design.

#### 4.3 Production Performance of Manufacturing Shops

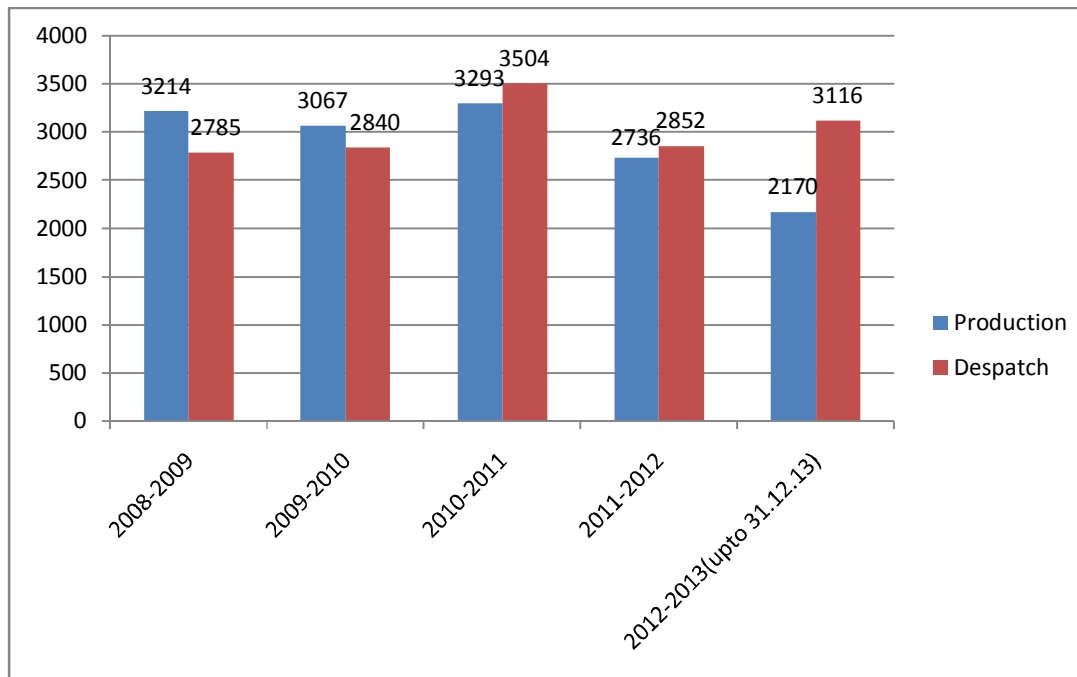
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Sl No.	Name of items	2011-12	2012-13	2012-13 (up to Dec02)	2013-14 (up to Dec03)	Comparison of production of 2013-14 with 2012-13 Excess(+), Less(-)
1.	Wheel set assembly	275 L/S	291 L/S	213 L/S	202 L/S	+11 L/S(non availability of WAG-9 /WAP-7 wheel disc and main gear of WAP-5)
2.	Hitachi Susp. Tube	552Nos.	537 Nos	426 Nos	206 Nos	- 220 nos.( Conventional loco target reduced by 22 L/s and material received from Trade)
3.	Hitachi Magnet	189 Nos	190 Nos	136 Nos	123 Nos	-13nos. (Non-availability of Steel

	Frame					components of Magnet Frame Kit)
4.	Stator 3 phase	394Nos.	394 Nos	288 Nos	333 Nos	+45 nos.
5.	Equaliser	139 L/S	120 L/S	93 L/S	82 L/S	-11 L/S (Conventional loco target reduced by 22 L/S))
6.	Compensating Beam	141 L/S	120 L/S	94 L/S	82 L/S	-11 L/S (Conventional loco target reduced by 22 L/S))
7.	WAG9 Head Stock	39 L/S	47 L/S	31 L/S	42 L/S	+11 L/S

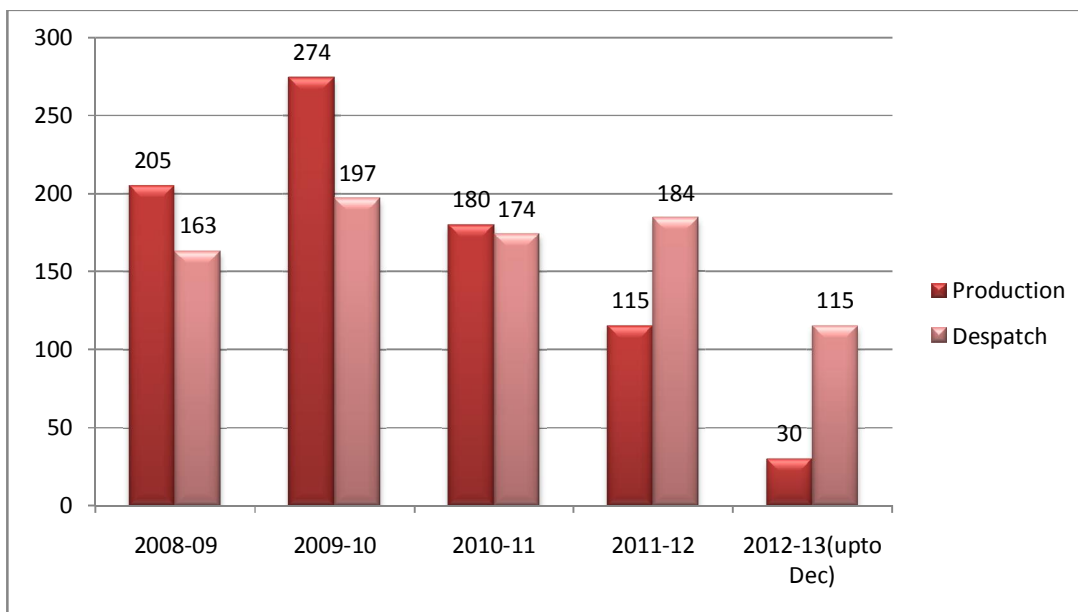
#### 4.4 Production Performance of Steel Foundry :

##### 4.4.1 Production and Despatch of Steel Castings over last five years—

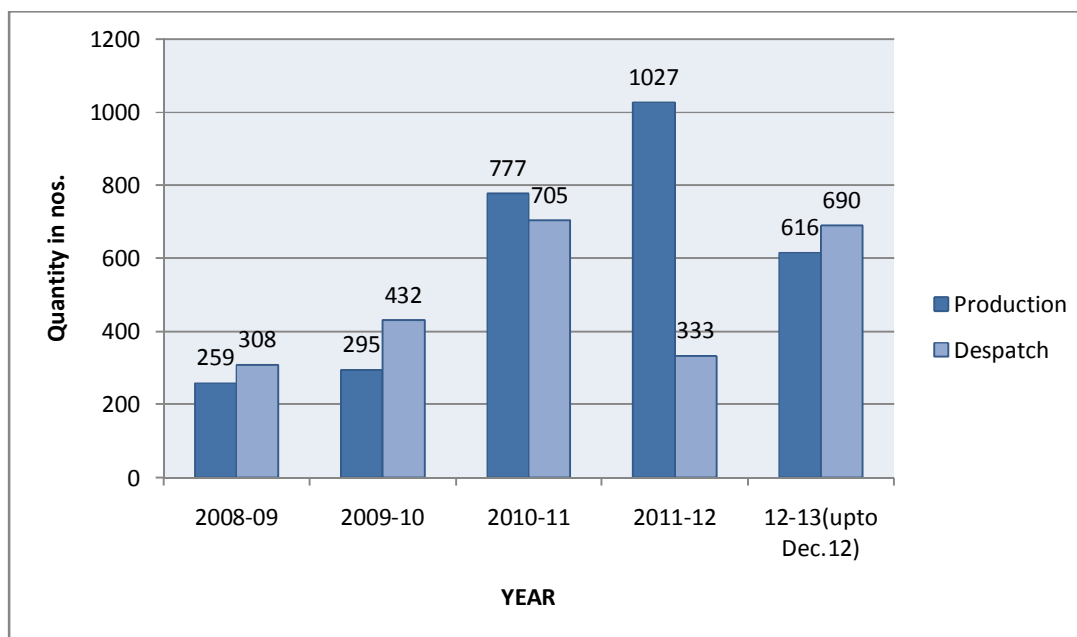




**4.4.2 Production and Despatch of Loco Bogies over last five years**



**4.6 Production & Desp. of Casnub Bogie Castings over last five years**



## Annexure – I

## YEARLY OUTTURN OF ELECTRIC LOCOMOTIVES FROM CLW

Year	WC M-5	DC WC G-2	AC MT WA G-1 WA G-4	ACMT (WK) WAM -4B	WAG -5A	ACMT WAP -1,3,4	ACMT WCA M-4	WAG -7	DC WC M-6 WC G-3	ACMT WAM -4	WAG -9	WAP -5	WAP -7	Grand Total
1961-62	05													5
1962-63	14													14
1963-64	2		2											4
1964-65			27											27
1965-66			32											32
1966-67			57											57
1967-68			50											50
1968-69			28											28
1969-70			31											31
1970-71		3	41							06				50
1971-72		6								40				46
1972-73		14								41				55
1973-74		14								36				50
1974-75		13					1			32				46
1975-76		4					4			46				54
1976-77		3					13			28				44
1977-78							18			41				59
1978-79				5			11			40				56
1979-80				2			6			43				51
1980-81				11		4				54				69
1981-82				17						33				50
1982-83				2						51				53
1983-84				17	21					9				47
1984-85					49	1								50
1985-86					54									54
1986-87					70	1								71
1987-88					65	1								66
1988-89					98	2								100
1989-90					100	5								105
1990-91					102	8								110
1991-92					104	10		1						115
1992-93					108	12		5						125
1993-94					105	15		20						140
1994-95					105	15		30						150
1995-96					61	14		59	1					135
1996-97					25	18		111	1					155
1997-98						28		137						165
1998-99						45		112			8			165
1999-00						60		50			8	1	1	120
2000-01						50		62			5	2	1	120

2001-02						34		40			6	-	2	82
2002-03						28		27			7	1	6	69
2003-04						32		36			9	-	9	86
2004-05						32		36			11	2	9	90
2005-06						40		60			24	1	4	129
2006-07						37		77			35	-	1	150
2007-08						42		98			49	3	3	200
2008-09						51		115			31	3	20	220
2009-10						40		120			39	3	18	220
2010-11						40		120			40	12	18	230
2011-12						47		135			45	12	19	258
2012-13						37		123			57	13	40	270
2013-14 (upto 31.12.13)						17		81			69	12	25	204
<b>TOTAL</b>	<b>21</b>	<b>57</b>	<b>268</b>	<b>54</b>	<b>1067</b>	<b>771</b>	<b>53</b>	<b>1655</b>	<b>02</b>	<b>500</b>	<b>443</b>	<b>65</b>	<b>176</b>	<b>5132</b>
<b>Summary as on 31.12.13</b>						<b>Steam locos – 2351 nos.</b> <b>Diesel locos – 842 nos.</b> <b>Electric locos – 5132 nos.</b> <b>Total - 8325nos.</b>								

**Annexure - II**

**ANNUAL PRODUCTION OF TRACTION MOTORS AT CLW**

Year	MG-1580	TAO-659	HS15250A	6FRA6068	6FXA7059	TOTAL
1969-70	92	-	-	-	-	92
1970-71	92	-	-	-	-	92
1971-72	18	129	-	-	-	147
1972-73	-	75	-	-	-	75
1973-74	-	195	-	-	-	195
1974-75	-	255	-	-	-	255
1975-76	4	349	-	-	-	353
1976-77	12	233	-	-	-	245
1977-78	12	425	-	-	-	437
1978-79	8	425	-	-	-	433
1979-80	8	385	-	-	-	393
1980-81	10	432	-	-	-	442
1981-82	5	430	-	-	-	435
1982-83	8	420	-	-	-	428
1983-84	4	361	-	-	-	365
1984-85	1	305	-	-	-	306
1985-86	3	325	-	-	-	328
1986-87	12	440	-	-	-	452
1987-88	6	380	-	-	-	386
1988-89	8	350	79	-	-	437
1989-90	14	350	-	-	-	364
1990-91	9	450	21	-	-	480
1991-92	5	500	80	-	-	585
1992-93	6	500	95	-	-	601
1993-94	2	400	250	-	-	652
1994-95	-	220	422	-	-	642
1995-96	-	92	630	-	-	722
1996-97	-	36	701	-	-	737
1997-98	-	4	750	-	-	754
1998-99	-	-	755	6	-	761
1999-00	-	-	600	6	4	610
2000-01	-	-	528	30	-	558
2001-02	-	-	400	36	4	440
2002-03	-	-	320	76	14	410
2003-04	-	-	392	124	8	524
2004-05	-	-	417	128	4	549
2005-06	-	-	726	205	-	931
2006-07	-	-	761	276	4	1041
2007-08	-	-	896	321	8	1225
2008-09	-	-	881	316	5	1202
2009-10	-	-	815	390	24	1229
2010-11	-	-	1000	373	44	1417
2011-12	-	-	900	332	43	1275
2012-13	-	-	913	564	60	1537
2013-14 (upto 31. 12. 13)	-	-	524	626	42	1192
<b>Total</b>	<b>339</b>	<b>8466</b>	<b>13856</b>	<b>3809</b>	<b>264</b>	<b>26734</b>

## Annexure - III

## ANNUAL PRODUCTION OF STATIC EQUIPMENTS AT CLW

YEAR	Motor Contactor (MC)	Shunting Contactor (SC)	Electric Magnetic Contactor (EMC)	Breaking Excitation Contactor (C145)	Reverser (J)	Traction Breaking Switch (CTF1,2 & 3)	Master Controller (MP)	Inductive Shunt (SJ)	Smoothing Reactor (SL)
1972-73	125	864	592	--	123	--	121	129	46
1973-74	185	754	495	--	102	--	94	171	73
1974-75	135	624	449	--	120	--	104	103	49
1975-76	257	812	576	--	104	--	123	147	70
1976-77	243	816	560	005	101	015	118	183	64
1977-78	348	637	664	023	113	031	147	234	74
1978-79	349	692	628	023	100	019	134	210	75
1979-80	330	838	667	009	092	022	126	231	66
1980-81	412	843	729	001	112	041	146	219	52
1981-82	514	784	709	065	126	124	157	209	90
1982-83	630	885	606	049	118	154	149	175	92
1983-84	776	548	696	112	100	165	140	066	100
1984-85	646	268	740	136	129	191	133	050	80
1985-86	686	480	860	076	125	213	155	039	104
1986-87	598	608	960	062	137	213	167	019	140
1987-88	604	416	1016	075	154	220	168	012	170
1988-89	602	616	830	101	336	167	203	150	210
1989-90	662	1200	920	110	238	282	230	215	220
1990-91	700	1800	960	120	240	345	240	310	240
1991-92	740	2360	1075	105	250	360	250	340	242
1992-93	750	2400	1124	100	295	405	290	390	250
1993-94	906	2718	1216	133	337	409	300	400	280
1994-95	972	2945	1162	157	324	450	320	480	300
1995-96	948	2630	1057	138	316	384	300	404	254
1996-97	868	2752	976	130	276	378	292	450	308
1997-98	980	2268	1105	157	339	439	342	495	340
1998-99	982	3577	983	128	350	453	343	500	321
1999-00	853	2672	932	139	291	339	285	390	260
2000-01	728	2469	952	129	328	408	237	268	224
2001-02	698	1565	549	122	277	390	200	280	210
2002-03	490	1244	740	80	158	340	165	154	164
2003-04	580	1796	1089	171	249	246	200	212	151
2004-05	534	1770	696	141	183	286	178	213	124
2005-06	708	2430	1066	181	256	450	232	322	206
2006-07	810	2500	965	200	268	446	270	375	239
2007-08	1020	2800	1020	222	324	416	275	457	304
2008-09	933	2588	1044	158	272	482	338	362	196
2009-10	480	1560	520	80	160	240	160	232	149
2010-11	480	1560	520	80	160	240	180	271	124
2011-12	480	1560	430	80	156	210	180	259	145
2012-13	480	1560	430	80	140	210	210	231	139
2013-14 (up to 31.12.13)	306	872	270	51	79	114	89	157	96
Total	25528	65081	33578	3929	8458	10297	8491	10514	7041

5

DESIGN & DEVELOPMENT  
INCLUDING TOT

## 5. CENTRE FOR DESIGN & DEVELOPMENT:

### 5.1 Setting of Centre of Excellence at CLW for Design and Development of New Technology Equipment for Electric Rolling Stock

The purpose of establishing the Centre of Excellence is to develop capability for designing, development and evaluation of advanced technology systems for Electric Rolling Stock. Consultancy work has been awarded to M/s E.C. Engineering/Poland

#### Status:-

All specifications have been approved by Rly. Brd. NSR for item nos. 1, 2, 3, 4 and 5 under finance vetting since 16.10.2012. Finance vetting is still awaited.

### 5.2 Development of IGBT Technology based Power Converter for 3-phase Locomotives

The present Power Converter is based on GTO technology which is slowly getting outdated by improved IGBT technology. So far, a total order of 138 L/sets of IGBT based power converters have been placed on different firms (M/s. BHEL . 57 L/sets, CGL . 03 L/sets, BTIL . 15 L/sets & ABB . 63 L/set).

#### Status:-

**BTIL:** First loco with IGBT based Traction Converter commissioned in loco 31234 and turned out from CLW on 18.12.09. Homed at ELS/GMO in DHN division. Presently 14 locomotives with BT supplied IGBT based traction converters are running.

**BHEL:** First loco with IGBT based Traction Converter commissioned in loco 31248 and turned out from CLW on 04.10.10 homed at ELS/LGD in SC division.

Presently 24 locomotives with BHEL supplied IGBT based traction converters are running.

**CGL:** One set commissioned in loco No. 31412 and dispatched in Sept 03. Slip Slide test of locomotive is in progress at ELS/GMO. Supply of remaining sets to commence after the trial run of the prototype set.

**ABB:** First loco with IGBT based Traction Converter commissioned in loco 31281 and turned out from CLW on 31.01.11 homed at ELS/AQ in NGP division. Presently 19 locomotives with ABB supplied IGBT based traction converters are running.

### 5.3 Development of IGBT Technology based Auxiliary Converter for 3-phase Locomotives

The Auxiliary Converter presently being used are also GTO technology based which is getting obsolete. In order to adopt the latest IGBT technology, this project has been undertaken. So far, a total order of 132 L/sets of IGBT based Auxiliary converters have been placed on different firms (M/s. BHEL . 46 L/sets, CGL . 41 L/sets, BTIL . 15 L/sets HIRECT -10 & ABB . 20 L/set).

#### Status:-

**BHEL:** First loco with IGBT based Auxiliary Converter commissioned in loco 31248 and turned out from CLW on 04.10.10 homed at ELS/LGD in SC division. Presently 24 locomotives with BHEL supplied IGBT based Auxiliary converters are running.

**AAL:** Loco No. 31415 (WAG-9H) dispatched to ELS/TKD on 01.08.2013. Performance under watch. Supply of remaining sets to commence after the trial run of the prototype set.

**HIRECT:** Prototype unit received at CLW. Firm to commission in locomotive.

**CGL:** Installed in Loco No. 30325. Loco dispatched to ELS/LGD in SC division on 29.10.2012. Presently 13 locomotives with CGL supplied IGBT based Auxiliary converters are running.

**ABB:** Converter commissioned in loco 31351 (WAG-9H) & was turned out from CLW on 31.08.12. Presently 08 locomotives with ABB supplied IGBT based Auxiliary converters are running.

### 5.4 Development of Open Platform Control System for Vehicle Control with TCN compatibility

#### a. Hardware:

The control system used in three-phase loco is MICAS-S2, which is proprietary of BT. CLW has taken up a project to develop control system hardware and software based on published IEC standards viz. IEC-61375 TCN. Tender Case No. 70/2004/1109 has been opened and P.O. placed on M/s. BHEL for 3 sets & M/s. Stesalit for 02 sets.

**Status:-**

**BHEL:** 1st loco set commissioned in Loco No. 31295 (WAG-9) LGD since Oct. 2011. The loco is running under ELS LGD since Oct. 2011. Remaining 02 sets commissioned on loco Nos. 31367 & 31399.

**Stesalit:** Material received at CLW on 07.11.2013. Firm to submit technical details about development of application software.

**b. Software:**

Authoring of Vehicle Control Software for TCN/IEC-61375 Compliant Hardware for 3-Phase Locomotives awarded on M/s. ARC, Bangalore.

**Status:**

Software in 1st loco set downloaded in Loco No. 31295. The loco is running under ELS/LGD since Oct. 2011. Remaining 02 sets commissioned on loco Nos. 31367 & 31399.

**5.5. Indigenous development of TCN compliant vehicle control system through C-DAC.**

This project has been undertaken through C-DAC for development of TCN compatible vehicle control system which will ensure compatibility between open standard equipments of different makes. MoU is for developing 02 sets of TCN compliant vehicle control system.

**Status:**

Commissioning has been completed in loco No. 31356 (WAG-9H). Loco dispatched to ELS/TKD. Performance under watch.

C-DAC has requested for additional funds for the project vide letter dated 29.10.2012.

Revised estimate prepared and under finance concurrence.

A meeting was held at C-DAC/TVC on 06th & 7th Jan 2014 to discuss modalities for transfer of ToT from C-DAC to prospective suppliers.

**5.6. Development of modular and Universal Aux. Converter for Locos & EMUs with C-DAC**

This project shall result in development of a modular universal auxiliary converter for railway rolling stock so that the same electrics can be used in 3-phase loco, tap changer loco and EMUs. C-DAC/TVC is executing the project. MoU is for developing 07 prototypes of 130 kVA of modular and Universal Aux. Converter for Locos & EMUs.

**Status:**

Prototype has been received at CLW. Full load test completed in loco no. 31356 (WAG-9H). Test results evaluated by C-DAC. Box2 to be supplied to CLW.

C-DAC has requested for additional funds for the project vide letter dated: 25.10.2013.

Revised estimate prepared and under finance concurrence.

**5.7. Development of Wireless remote control for control of slave locomotives on a train.**

This project has been taken up as per RSP provision. The project shall help develop wireless communication amongst locomotives in a train formation leading to better adhesion and other operational advantages. 2 sets of this system have been ordered on M/s ARC Bangalore for 3-phase locomotives.

**Status:**

The prototype has been installed in loco nos. 31282 (WAG-9) & 31284 (WAG-9). Loco has been put into commercial service w.e.f. 18.05.2012.

2<sup>nd</sup> set received on 18.12.13. Loco to be nominated.

**Case for 75 locosets:** Tender opened on 29.05.2013. Case under TC.



**5.8. Development of wireless MU coupler system for AC tap changer locos.**

**Status:**

PO issued for 01 set each on M/s Medha and M/s Lotus Wireless

**M/s Lotus Wireless:** The equipment has been commissioned in July, 2012 in loco No. 28480 (WAG-7) & 28481 (WAG-7) and dispatched to ELS/KZJ.

**M/s Medha:** Provisional design clearance given by RDSO in Jan 2012. Brake interface under evaluation at RDSO.

**5.9. Development of Active Speed sensor with Doppler radar on 3-phase locos.**

This project is for improving slip slide control of 3-phase locomotive of Zonal Railways and appears in RSP. An order of 80 locosets placed on M/s ARC/Bangalore. Firm requested for extension of qty by further 62 sets.

**Status:**

All 80 sets have been installed in different sheds. (GMO-30, AQ-30 & LGD-20).

**5.10. Development of Hotel load Converter**

This is for utilizing OHE power for supply of hotel load of coaches through HOG Scheme by providing Hotel Load converter in the locomotive. Order placed on M/s AAL - 03 sets, Siemens - 03 set, BHEL . 04 set ABB-4 set and Medha- (01+07) sets.

**Status:**

**Siemens:** Hotel load converter fitted in 30277 (WAP-7) and dispatched to GZB on 30.06.2010. Commercial service of the loco started on 21.02.2011.

2<sup>nd</sup> set installed in loco No. 30365 (WAP-7) dispatched to ELS/GZB on 31.10.2013.

**BHEL :** Firm has not given time schedule for type test. RDSO is following the matter further.

**AAL:** Firm has revised dimensions of hotel load converter box. The same has been checked in the locomotive in presence of RDSO on 19.10.2013. RDSO has been advised to give necessary design clearance.

**ABB:** Prototype inspection to be held from 4<sup>th</sup> February 2014.

**MEDHA:** Loco No. 30375 (WAP-7) dispatched to ELS/GZB.

**5.11. Development of Alternate Drive Gear Assembly for WAP5 AC Electric Locos (160 Kmph).**

This project will address the reliability issues of the presently used hurth coupling by way of improved design of the transmission system. Procurement of 5 loco sets (20 Nos.) of new type of Drive Gear system as per RDSO specification.

**Status:**

- One locoset commissioned in Loco No. 30056 (WAP-5). Loco sent to ELS/Vadodara.
- RDSO to issue field trial clearance.

**5.12. Development of Alternate Drive Gear Assembly for WAP5 AC Electric Locos (200 Kmph).**

This project will address the reliability issues of the presently used hurth coupling by way of improved design of the transmission system. Procurement of 2 loco sets (08 Nos.) of new type of Drive Gear system as per RDSO specification.

**Status:**

Provisional I/C issued. Material expected in Feb 14. Installation to start after receipt of material.

**5.13. New Driver Display (100 nos.)**

The project has following rationale:

- 10.4+VGA Graphical Colour Display (TFT)

- Provides a number of graphic screens for process data visualization
- Trouble Shooting Directory.
- Aesthetically beautiful appearance.

**Status:**

**ARC:** All units have been installed by July 12. Performance from Rlys. has been collected and it has been made a regular item.

**Jayashree Engg. Works:** Test for communication performed by the firm at C-D&D in April 12. Firm has submitted internal test report on 31.10.13.

D.P. has expired. Firm to submit valid D.P. extension.

**N & S Solutions:** Test protocol of the firm has been approved on 25.12.2013. Firm has been asked to submit internal test reports and offer for prototype tests.

#### 5.14. Composite converter

Indian Railways has planned to migrate to IGBT based technology for its 3-phase WAP5 locomotives. Implementation of HoG scheme in WAP-5 loco is an issue because of the smaller size of the locomotive. Considering smaller size of the IGBT based traction converter vis-à-vis GTO based, IR has planned to implement the composite converter housing both traction and hotel load converter in the same cubicle in WAP-5 locomotives.

**Status:**

Tender opened on 09.11.2012. Case discharged. The revised specification under preparation in consultation with manufacturers and RDSO.

#### 5.15. Indigenous development of propulsion system

IGBT based 3-phase propulsion system consists of traction converter, auxiliary converter, and control electronics (Vehicle control unit).

An order of 15 loco sets placed on BHEL. Quantity was to be enhanced by 15 sets by operating special option clause as per Rly. Board's Contract. Railway Board has not agreed to enhance quantity by 15 sets.

An order of 05 loco sets placed on MEDHA.

**Status:**

**BHEL:** 1st loco set on Loco no. 31347 (WAG-9) dispatched to ELS/LGD on 11.7.2012.

14 more locomotives have been commissioned.

**MEDHA:** Loco No. 31427 (WAP-7) dispatched to ELS/LGD on 31.10.2013. Balance supply after clearance of field trial by RDSO.

### INNOVATIONS & DEVELOPMENTAL WORK :

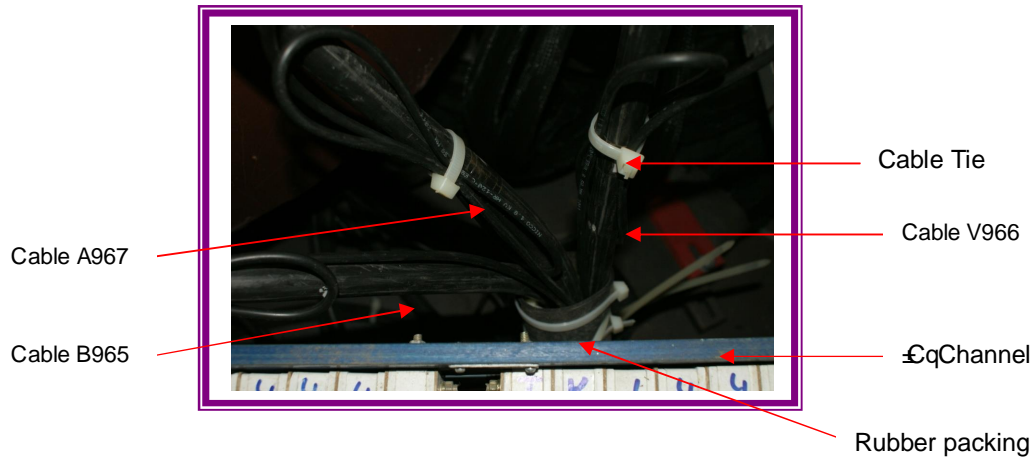
#### 5.16 INNOVATIONS & DEVELOPMENTS

*Innovations*

- **MU Operation of loco fitted with Microprocessor based control and fault diagnostic System :** Multiple unit operation of locos fitted with Microprocessor based control and fault Diagnostic System has been successfully completed at CLW on regular basis from March- 2012. Necessary circuit modification has been carried out and RDSO has been advised. Trial has been done with same make and different makes of FDSCS. This will facilitate smooth MU operation of these locos in Zonal Railways.



- **Modification in cable bunching of SIV cable:** Three output cables of SIV has been padded with rubber packing and secured with cable ties to avoid rubbing with  $\phi$ channel.



**Revised pipeline layout for WAP4 loco :** To avoid external hitting of under frame pipe lay out, the same has been shifted from underframe to machine compartment in L side wall with socket arrangements and double ferrule pipe fittings like 3-phase loco, No. 22901 & 22903. Regular cut-in will be made after getting regular supply of brass pipe fittings.



**Previous Layout**



**Modified Layout**



- **RDSO modification implemented IN(i)** No. RDSO/2012/EL/MS/0407 - Standardization of power selection switch position in Flasher unit in 3-phase loco. Implemented from loco No. 31341 and onwards.
  - (ii) No. 390 ó Paralleling of interlock ó Implemented from loco No. 31324, 30308 & 30047 onwards.
  - (iii) No. RDSO/2011/EL/MS/0404 ó Isolation of hard/soft QD during operation of HMCS SWITCH ó Implemented from loco No. 28443 onwards.
- Successful trial has been carried out under NR for operation of WAP-5 in multiple consists. Software modification for the same has been successfully completed at C-D&D/CLW. This will enable running of slave loco, without raising its pantograph, drawing OHE power from master locomotive through the HV cable. This will achieve running of Rajdhani/Shatabdi with 24 coaches at high speed using locos in multiple consists.
- A software modification has been carried out to improve the monitoring of Auxiliary Converter by Vehicle Control Unit (VCU). The software patch has been sent to different Railways for testing in 05 (five) locomotives each before the routine cut-in. This software modification will be helpful in preventing the isolation of Auxiliary Converter during the operation of locomotive.
- A new Induction Heating Puller developed for extraction of inner racer from Hitachi Armatures and 3-phase Rotors.
- 60 nos. Scheme-I type 3-phase Rotor for WAG-9 manufactured at CLW as per RDSO guideline out of which, 38 nos. already sent for field trial, rest are under motor assembly.
- One no. Hitachi Armature developed and manufactured by Traction Motor Shop with 3-phase Insulation Scheme to upgrade insulation class from 200°C to 250°C. This armature assembled in Motor No.11786 and fitted in Loco No.28374, such insulation scheme shall be switched over if performance is improved.

**5.17** Following design and development projects have been implemented in Electric Locomotives under manufacturing at CLW .

- Underslung Compressor : To increase the air capacity and create to the space inside the engine room, 1750 LPM underslung Compressor is provided in Loco No.22926,22975,22976
- WAP-5 Loco provided with MU Coupler : to enable hauling of 24 coaches train upto 160 kmph multiple unit (MU) operation has been provided in WAP-5 locomotives. Loco no. 30069 and 30070 in multiple consist are provided with this system.
- EP assist Brake : For quick release and application of brake in trail lock EP assist brake is provided in WAP-4 Loco no. 22967 & 22968.
- CCB in WAP-5 Loco : Computerized Control Brake system is introduced in passenger version of locomotives in Loco no.30072.
- Modified LSDBR Circuit : to avoid wrong indication of working of AC MVRF in MPCS fitted loco signaling light LSDBR circuit modified and introduced from loco no. 28627 onwards.
- Marker Light Circuit Modified: Marker light circuit modification implemented on regular basis.
- DU type Relay: In place of PC-8 type Relay DU type (QSIT) is introduced for flap type indication to the driver in aux. static converter circuit in conventional WAG-7 locomotive from loco no. 28632 to 28636.
- IGBT based Locomotives : Latest IGBT technology based power converter and aux converter have been introduced in place of existing GTO based converter in CLW make locomotives. 44 nos. locomotives have been dispatched with IGBT converter up to 31<sup>st</sup> December 2013.
- Indigenous IGBT Propulsion system : Indigenous IGBT based propulsion system comprising traction converter, aux converter & VCU developed by M/s Medha has been successfully commissioned in loco no. 31427 . Loco is presently in field trial under SCR.

6

# QUALITY ASSURANCE

## 6.QUALITY ASSURANCE

### 6.1 **Quality Objective & Targets:**

6.2 Inspection of locomotives and its components in the inspection shop to be done .100% strictly on the basis of work instruction and their related Design , Drawings, Specifications and Standard to meet Quality requirement on continuing basis.

### 6.3 **Other Objectives:**

6.3.1 Constant Endeavour for quality improvement of the products at all stages of manufacturing which are turned out from different shops of CLW.

6.3.2 To carry out inspections of various assembly and sub-assembly being manufactured in Traction Motor shops, Static Equipments Shops, Heavy m/c shop, light m/c shop, Loco fabrication shops and Steel Foundry shops as well as assembly and dispatch of locos.

6.3.3 To certify the Material Movement Slip for movement of products conforming to the drawing/WI/ Specification from one shop to other and consequently clearing job Cards related to that product.

6.3.4 To prepare Loco inspection Certificates and sent them to user Railways. The Inspection data on Standard Formats used to make the said Loco IC are now scanned instead of feeding the same to make it flaw less soft copy of the document.

### 6.4 **Achievements:**

6.4.1 DPT test for all round welding joints of Three Phase Axle Guide Bearing Post has been introduced from January 2013.

6.4.2 U/T test introduced (from December 2012) for checking the defects of covering plate welding joints with traction pillar in central under frame in 3 phase loco.

6.4.3 Existing inspection format of long beam assembly of WAG-7 loco has been separated for checking its components i.e. end boxes and middle box individually to avoid side deflection, twists and hogging.

6.4.4 100% marking operation included in Hitachi suspension tubes.

6.4.5 10% radiography test incorporated in Hitachi suspension tubes in order to prevent casting defects.

6.4.6 100% marking operation introduced in Rotor clamp to avoid shortage/ excess material in the casting.

6.4.7 10% radiography test incorporated in TM items i.e Commutator Spider and Rotor Clamp to avoid shortage/excess material in the casting.

6.4.8 New check list has been introduced for checking the ventilation ducts in WAP-5 loco w.r.t longitudinal and center line of loco.

6.4.9 Copper strip in BA panel being insulated by taping to avoid flashover.

6.4.10 MCP cables at oil tray being protected by means of additional wrapping of rubber sheets.

6.4.11 100% Radiography introduced in Centre Pivot Pin to prevent casting . Fabrication shop advised to follow the TOT Welding Procedure Specification for welding of Centre PIVOT Pin.

6.4.12 Alternate route for laying of FDCS Cables implemented to avoid rubbing/pressing of cables on BD Panel top.

6.4.13 Profile checking of CBC introduced to ensure proper engagement of CBC.

### 6.5 **METALLURGICAL & CHEMICAL LABORATORY**

Metallurgical & chemical Laboratory headed by Deputy Chief chemist & Metallurgist , and assisted by associated officer of Chemical and Metallurgical wing is responsible for quality assurance of Electric Loco components by conducting metallurgical , chemical and non-destructive test of casting , forging & fabricated components as well as physical-chemical test of non-metals , rubber items , paints & oil lubricants . It consists of three units i.e main Lab., NDT Lab, loco works and Steel Foundry.

The M & C Laboratory ensures quality control of inputs and finished products of Steel Foundry including stage wise process control. The M&C wing of Steel Foundry developed CBC coupler & its component as per

RDSO Specn. 56BDO7 for Electric Locomotives, Wagon Coupler as per RDSO Specn.48BD08 & also E-type coupler for EMD Locomotives of DLW.

Quality control of castings like CO ó CO Bogie, FC bogie, Bolster, Casnub bogie, Suspension tube high tensile CBC Coupler etc. being closely monitored by M&C department for heat treatment cycle & their mechanical & metallurgical properties. It also ensures quality control of different raw material of Steel Foundry like Ferro ó manganese, Silico ó Manganese, Ferro-silicon, Ferro- molly, iron ore, silica sand, core binders, bentonite power etc. It also ensures quality control of furnace consumables like basic lining bricks, high alumina bricks, ladle bricks etc.

M&C Lab of SF consists of Central Lab, NDT Lab, Field Furnace Lab etc.

NDT Lab./SF arranges radiography as per RDSO Specn of various heavy critical steel casting to ensure casting quality as per specification.

Main activities of M&C organization is as under:-

- i) CLW Steel Foundry now as a Class ó A foundry as per IS 12117 : 1996 & approved by RDSO/LKO.
- ii) Steel Foundry indigenously developed high tensile CBC Coupler for Electric locomotives as per RDSO Specn. 56BD07 , Wagon Coupler as per RDSO Spec. 48BD08 & approved by RDSO/LKO.
- iii) CLW Steel Foundry also recently developed E-type Coupler for EMD Locomotive for DLW.
- iv) CLW Steel Foundry got a developmental order (40 nos.) for óH-typeölight lock coupler for DLW.
- v) CLW Steel Foundry started training to welders (48 nos.), oxy-cutter(35 nos.) & fettler(105 nos.) from Govt. Training Institute, ATI, Das Nagar/Howrah for betterment of fabrication as well as heavy casting for finishing quality work.
- vi) CLW Steel Foundry is also sending JE/SSE (60 nos.) for total personality development training programme at Ludhiana for quality improvement & enchasement of latest modern foundry technology practices.
- vii) Internal & external ISO: 9002 & ISO: 14000 audits as per ISO requirement & timely calibration of testing equipment.
- viii) Testing of Loco items as per loco production target to meet the requirement.
- ix) Testing of water samples and controlling various parameters of drinking water requirements.
- x) Review of specification from time to time for quality improvement.

Metallurgical & Chemical Lab conducts metallurgical investigations of in-service failures of components of CLW build locomotives. It maintains liaison with RDSO , BIS & other Non-Railway institutions on M&C matters.

The laboratory is being further upgraded by procuring state of the art UTM of 100 online test reporting system.

M&C Department is also in a project stage of computerization , upgradation of online test reporting system.

## 6.5.1 PERFORMANCE w.e.f. 01-01-2013 to 31.12.2013

### 6.5.1.1 METALLURGICAL & CHEMICAL LAB/LOCO: (.1.1.13 to 31.12.13 )

Sl. No.	Name of Lab.	No. of Sample Tested			Nos. of Tests			No. of Sample Accepted			% of Rejection		
		2011	2012	2013	2011	2012	2013	2011	2012	2013	2011	2012	2013
1.	Metallurgical/ Mechanical Lab.	1530	2667	3135	2918	6983	6637	1407	2580	3040	8.03	3.26	3.15
2.	Chemical Lab.	2508	3559	3421	14673	20504	19489	2446	3509	3392	2.47	1.4	0.93
3.	Filter House Lab.	1960	1993	2014	15241	16670	16895	1960	1993	2014	Nil	Nil	Nil
4.	Rubber , DMC, I. M. & Lubricant	169	311	257	274	456	354	162	271	235	4.14	12.86	8.56
<b>TOTAL →</b>		<b>6167</b>	<b>8530</b>	<b>8827</b>	<b>33106</b>	<b>44613</b>	<b>43376</b>	<b>5975</b>	<b>8353</b>	<b>8681</b>	-	-	-

**6.5.1.2 NDT LABORATORY (LOCO):**

Sl. No.	Name of Lab.	No. of Sample Tested			Nos. of Location/ Component Tested			Nos. of Component accepted			% of Rejection		
		2011	2012	2013	2011	2012	2013	2011	2012	2013	2011	2012	2013
1.	Ultrasonic Testing	5594	6991	9786	17380	22253	27744	5519	6939	9513	0.37	0.74	2.78
2.	M P T	7135	5975	5517	21020	18480	15315	7135	5975	5510	0.28	Nil	0.12
3.	Radiographic Test	360	251	166	360	251	166	360	251	Nil	Nil	Nil	-
4.	Misc.	370	374	1709	968	937	3114	370	374	1696	Nil	2.94	0.76
TOTAL →		13459	13591	17178	39728	41921	46339	13384	13539	16719	-	-	-

**6.5.1.3 METALLURGICAL & CHEMICAL LABORATORY /STEEL FOUNDRY:**

**6.5.1.4 CHEMICAL LABORATORIES:**

Sl. No.	Name of Lab.	No. of Sample Tested			Nos. of Tests		
		2011	2012	2013	2011	2012	2013
1.	Chemical Lab.	3520	3118	2773	18336	17498	16770
2.	Chemical Misc.	166	62	135	1138	361	949
TOTAL		3686	3180	2908	19474	17859	17719

**6.5.1.5 FIELD LABORATORY/S. F. :**

Sample Test					Physical & Radiographic Tests			
Sl. No.	Name of Test	No. of Tests			Name of Test	No. of Tests		
		2011	2012	1.1.13 To 31.12.13		2011	2012	1.1.13 To 31.12.13
1.	Zircon Wash	44	30	39	Tensile Strength	1436	1484	1250
2.	Green Sand	5799	6644	5689	Microstructure	426	395	505
3.	Permeability	994	1093	983	Charpy	0	-	0
4.	No-bake Sand	554	1048	958	Hardness	135	142	985
5.	Silica Sand	74	79	76	Radiography Exposures	9566	10975	11119
Total		7465	8963	7745	Total	11563	12996	13859



7

# Marketing including export

( Supply of spares to Zonal Railways )

# 7. Supply of spares

## 7.1 LIAISON & SERVICES WING:

There are 27 Electric Loco Sheds and 7 POH/Repair shops on the Indian Railways, which are engaged in the operation/maintenance of Electric Locomotives. The Liaison and Service (L&S) Wing of CLW has to perform the task of meeting the requirements of Capital spares allotted by Railway Board & Railways own needs of Spares for their loco sheds and workshops. Broadly Liaison and service wing performs the following functions.

## 7.2 FUNCTIONS:

The salient functions of L& S wing are as under:

- Consolidating the demands in the form of Requisitions/indents from Railways for purchased, Shop manufactured as well as imported items.
- Co-ordination with Stores department for the procurement of purchased items and to issue work orders from the shop manufactured item.
- Supplying spares to railways through stores/shops taking due care of demands and availability. L&S wing also maintains the accountal of such supplies.
- Monitoring of Performance of new locomotives built by CLW and dispatched to various Electric loco sheds, by way of getting feedback from the Railways.
- With the population of Electric Locomotives increasing steadily, the task of Liaison and Sales Wing has increased for effective monitoring of the performance of newly built Electric locomotives and for providing support for the capital spares as well as the requirement of spares by the Railways for maintaining the Locomotives in service.

## 7.3 SPARES TO RAILWAYS:

The supply of spares to various user Railways is one of the most important function of L&S wing. All-out efforts are made to fulfill the demands of Capital spares as well as the requirement of spares by the Railways. In the year 2013-14 spares worth Rs90.77crores (as on 31.12.13) were supplied to the Railways as compared to Rs. 93.97 crores in the year 2012-13. The break up of the same may be seen at Annexure -A.

**Supply of spares to Zonal Railways against Rly. Board's RSP & Requisitions of Zonal Railways in December-2013**

ANNEXURE - 'Aø (All Costs are in Rs. lakh)

Sl.	Item description	QUANTITY SUPPLIED DURING March 2012												Total qty.	Total cost of supply							
		CR B/Req	ECOR B/Req	ECR B/Req	ER B/Req	NCR B/Req	NR B/Req	SCR B/Req	SECR B/Req	SER B/Req	SR B/Req	WCR B/Req	WR B/Req									
1	TM for G-9/P-7 (3 )																	2	2	44.39		
2	TM for P-5 (3 )																					
3	Stator of TM for G-9 (3 )																					
4	Rotor of TM for G-9 (3 )																					
5	Rewind Stator (3 )																					
6	Transformer of G-9 (3 )																					
7	Transformer of P-5 (3 )																					
8	Auxiliary Converter (3 )																					
9	Central Electronics (3 )																					
10	Traction Converter (3 )																					
11	Speed Sensor (3 )																					
12	Master Controller (3 )																					
13	O.C.U (Blower + Radiator) (3 )					2														2	6.60	
14	HB-1/HB-2 (3 )																					
15	E-70 Brake System (3 )																					
16	Access tool/ Diagnostic System (3 )																					
17	Trade brake arrangement(3 )																					
18	TM (Hitachi)	3				5			5			3		6		3				25	782.25	
19	TM (H)-Armature																					
20	Transformer 5400 KVA																					
21	Static Converter																					
22	VCB																					
23	DBR (Roof Mounted)																					
24	DBR (Vertical)																					
25	RSI																			1	1	16.04
26	Tap Changer																					
27	Microprocessor Based Control & Fault Diagnostic System																					
28	DI/DU Relay																					



**Supply of spares to Zonal Rlys against Rly Bd's RSP & requisitions of zonal Rlys from April 2013 to Dec.2013**

**(ANNEXURE-B) (All Costs are in Rs. Lakh)**

Sl.	Item description	QUANTITY SUPPLIED FROM 01.4.13 TO 31.12.13														Total qty.	Total cost of supply								
		CR B/Req	ECOR B/Req	ECR B/Req	ER B/Req	NCR B/Req	NR B/Req	SCR B/Req	SECR B/Req	SER B/Req	SR B/Req	WCR B/Req	WR B/Req												
1	TM for G-9/P-7 (3 )				2*	3					3	2	2			2		2				16	387.64		
2	TM for P-5 (3 )																								
3	Stator of TM for G-9 (3 )																								
4	Rotor of TM for G-9 (3 )								3			8											13	89.46	
5	Rewind Stator (3 )																								
6	Transformer of G-9 (3 )																	2					2	247.84	
7	Transformer of P-5 (3 )																								
8	Auxiliary Converter (3 )					1														1			3	201.10	
9	Central Electronics (3 )						1														1		3	86.88	
10	Traction Converter (3 )					1															1		3	773.07	
11	Speed Sensor (3 )																								
12	Master Controller (3 )		2																				2	3.50	
13	O.C.B Unit (3 )		2			4	4				4												14	54.35	
14	HB-1/HB-2 (3 )																								
15	E-70 Brake System (3 )						1																1	33.40	
16	Access tool / Diagnostic System (3 )																								
17	Trade brake arrangement(3 )						2																2	51.51	
18	TM (Hitachi)	13	2	3		9	9	6	2		5		9		6	9	15		3			17	108	3059.26	
19	TM (H)-Armature																								
20	Transformer 5400 KVA			1												3							4	157.44	
21	Static Converter						1	1			2												4	95.14	
22	VCB					2															2		4	11.14	
23	DBR (Roof Mounted)																								
24	DBR (Vertical)																								
25	RSI		1			2			1		2					1						1	8	122.16	
26	Tap Changer																								
27	Microprocessor Based Control & Fault Diagnostic System																								
28	DI/DU Relay											12											12	53.62	
29	Smoothing Reactor (SL-30)												2		4								6	57.18	
30	Reverser-J																								
31	C.T.F																								
32	E.M.C																								



8

# STATUS OF M&P

## 8. MACHINERY AND PLANT

### **Manufacturing, M&P Maintenance, Transport, Machinery & Plant Procurement**

Manufacturing group of shops consists of Heavy machine shop, Wheel shop, Light machine shop, Smithy & Forge shop, Heat Treatment shop and Tool Room. Millwright and Electrical Maintenance shops look after maintenance of all M&Ps of loco works, power supply and distribution inside loco works. MPP cell deals with planning and process for procurement of machines sanctioned by Rly.Board under M&P Plan Head-4100 & 4200. It also looks after TPT shop including Road and Industrial vehicle maintenance work and shunting work. M&P section deals with commissioning of new heavy machines and warranty issues.

#### **8.1 Manufacturing shops:**

(i) Wheel Shop: **Wheel shop manufactures wheel sets for loco production as well as spares to Zonal Railways. Presently wheel sets for WAP4, WAP5, WAP7, WAG7 and WAG9 locos are manufactured.**

(ii) Heavy Machine shop: **Heavy machine shop undertake machining of components for loco production as well as meeting the spares required for zonal railways such as suspension tube, 3-ph stators for WAG9 & WAP5 locos, Hitachi Magnet Frame, Equalizer & Compensating beams etc.**

Machining work of Steel Castings from Steel Foundry like centre pivots of WAP4, CBC Coupler are also done in HMS.

(iii) **Smithy & Forge shop:** SFS undertakes fabrication of Head Stock of WAP7 loco, forging of small components of loco assembly, assembly of casnub bogie.

(iv) **Light Machine Shop:** Light Machine Shop manufactures small components like bushes, traction motor blower holding plates etc. to meet requirement of loco production as well as spares required for zonal railways.

(v) **Tool Room:** Tool room supplies toolings, gauges, jigs & fixtures for production requirements of various shops also carries out calibration of various gauges, fixtures, instruments etc to meet the ISO requirements.

(vi) **Heat Treatment Shop:** Heat Treatment Shop undertakes heat treatment of bogies manufactured in Loco Shop and other items e.g. Magnet Frame, Equalizer, Compensating Beams etc. manufactured in Heavy Machine Shop.

**Performance of Manufacturing Shop is furnished in the Annexure-‘A’**

#### **BRIEF REGARDING PLANT MAINTENANCE ORGANISATION (LOCO WORKS)**

CLW has more than 1500 M&Ps including 117 Nos. Cranes in Loco Works, out of which 50% of M&Ps are overaged. The breakdown as well as preventive maintenance of M&Ps is carried out by the Plant Maintenance Organisation consisting of Millwright Shop (MTS-56) and Electrical Repair Shop(Shop-59). Plant Maintenance Organisation deals with repairing, reconditioning, re-engineering, retro-fitment of machineries and plant. Installation of new small machineries and plants, condemnation & uprooting of old M&Ps are also carried out by the Maintenance Shops-56 & 59.



## **8.2 SPECIAL WORK DONE DURING 2013-14**

1. HMT CNC Profile Milling Machine (No. 05/2598/01), a vital machine of ELB Shop was under long breakdown due to defective PCU-50. The machine has been repaired successfully by providing new PCU-50 and backup software. The machine has been working satisfactorily since then.
2. Zayer -1 CNC Bogie Machining Centre, a very vital machine of Shop-18 for bogie machining was under breakdown from 21.12.2012 due to defective PCU of Siemens make. The warranty of the machine has also expired. The defective PCU has been repaired with the assistance of Siemens and the machine has been put back into service for production. The machine is running satisfactorily since then.
3. HYT Double Headed Boring Machine No. 08/1887/01, a critical machine of HMS, went under major breakdown due to spindle barrel jam, damage of spindle box nut bracket. The machine has been repaired thoroughly in-house by MTS without OEM's support and the machine is working satisfactorily for production of Hitachi Suspension tube.
4. 400T Hydraulic Press brake is a very vital machine for shell production. It went under breakdown from 24.06.13 due to defects in CN controller. The defective CN controller has been repaired inhouse by dedicated CNC team of ERS and the machine has been put back into service for regular production.
5. Craven Milling M/c No. 05/2310/03 of ELB Shop/05, a very old machine installed in the year 1951 went under breakdown due to failure of axis drive motor. The machine has been repaired inhouse jointly by MTS & ERS. The machine has been working satisfactorily since then.
6. BH-160-II Machine of ELB/Shop-18(M/c No. 18/2596/02) went under breakdown due to failure of AC drive motor for column movement. The machine has been repaired in house by ERS making alternative arrangement by providing DC Motor with suitable modified circuit. The machine has been handed over to production.
7. Zayer-1 CNC Bogie Machining Centre(18/2463/01) for Bogie Machining went under breakdown due to leakage of refrigerant through rubber hose pipe inside vertical head of the machine. Maintenance Wing(MTS) replaced the damaged pipes with copper pipes & re-aligned the same with connectors to arrest the leakage. The machine has been re-commissioned and handed over to production.
8. Denobat CNC Axle Turning Lathe(M/c No. 09/1114/01) of Wheel Shop installed in 2009 is a very vital machine for production of finished axle of wheel set. This machine went under breakdown on 09.9.13 due to heavy leakage of coolant from the conveyor housing. The defects have been repaired in house thoroughly by MTS.
9. The EOT Crane No. S/E/03 of NP Yard went under major breakdown due to crack of both LT gear box housing. The same have been repaired inhouse thoroughly, re-assembled by MTS and the crane has been handed over for use.
10. The EOT Crane No. S/E/03 of NP Yard went under major breakdown due to crack of both LT gear box housing. The same have been repaired inhouse thoroughly, re-assembled by MTS and the crane has been handed over for use.
11. Relaying of Main Compressor Pipe Line raising its height suitably has been done at five main locations between T.O Gate to ELF/Shop-26 area to facilitate infringement-free passage of high height consignments like wooden casing containing M&Ps and Loco shells coming from trade.
12. Bristol EOT Crane(No. 26/E/03) of Shell Shop-26 installed in the year 1963 went under breakdown from 19.09.13 due to wear & tear of LT Shaft, Brake Drum, Wheel bearings, Couplings etc. and the condition was such that it was not safe to operate. Major repair work on this crane has been done replacing the old and worn out parts and commissioned successfully.
13. Jordi Shearing M/c No. 15/7065/01 of Shop-15 had been giving trouble after commissioning in the year 2009. Finally, the machine went under breakdown on and from 25.02.12 due to defects in PLC. The machine has been repaired after procuring & installing new PLC and commissioned on 28.11.13.
14. Marufuku Plano Miller of ELB/Shop-18 is a very old but vital machine, installed in the year 1981. This machine went under breakdown from 26.10.13 due to complete damage of pendent cables cause by rodent.

The machine has been thoroughly repaired inhouse by Electrical Maintenance Wing with new rewiring and commissioned. The machine is being utilized by production shop for bogie machining since then.

### **8.3 SAVINGS IN MACHINE HOUR LOSS IN HRS.**

<b>Month</b>	<b>2012-13</b>	<b>2013-14</b>
<b>April</b>	<b>2749</b>	<b>2733</b>
<b>May</b>	<b>2716</b>	<b>2704</b>
<b>June</b>	<b>3165</b>	<b>3152</b>
<b>July</b>	<b>3070</b>	<b>3054</b>
<b>August</b>	<b>2716</b>	<b>2704</b>
<b>September</b>	<b>3421</b>	<b>3408</b>
<b>October</b>	<b>3426</b>	<b>3421</b>
<b>November</b>	<b>2878</b>	<b>2864</b>
<b>December</b>	<b>3374</b>	<b>3357</b>
<b>Total</b>	<b>27515</b>	<b>27397</b>

### **SAVING IN MACHINE HOUR LOSS**

Machine hour loss upto December, 13 during the year 2013-14 has been 27397 hours as against 27515 hours during the corresponding period of the previous year. Thereby, saving in Machine Hour loss till December, 13 has been 0.42% with respect to the previous year (2012-13).

### **8.4 UPTIME AVAILABILITY OF CRITICAL MACHINES**

The availability of 80 critical machines in Loco Works has been 95.64% during the year 2013-14 as against the target of 92%. The uptime availability of 80 critical machines was 94.72% during the corresponding period of the previous year (2012-13).

### **8.5 Production Performance of manufacturing shop**

Sl.No	Name of Item	2011-12	2012-13	2012-13 (upto Decø12)	2013-14 (upto Decø13)	Comparison of Prod. 2013-14 with 2012-13 Excess(+) Less(-)
1	Wheel Set Assembly	275 L/S	291 L/S	213 L/S	202 L/S	-11 L/S (Non-availability of WAG9/WAP7 wheel disc and main gear of WAP5)
2	Hitachi Susp. Tube	552 nos.	537 nos.	426 nos.	206 Nos.	- 220 nos. (Conventional loco target reduced by 22 L/S and material received from Trade)
3	Hitachi magnet frame	189 nos.	190 nos.	136 nos.	123 Nos.	-13 nos. (Non-availability of Steel Components of Magnet Frame Kit)
4	Stator 3 Phase	394 nos.	394 nos.	288 nos.	333 Nos.	+45 Nos.
5	Equalizer	139 L/S	120 L/S	93 L/S	82 L/S	-11 L/S (Conventional loco target reduced by 22 L/S)
6	Compensating Beam	141 L/S	120 L/S	94 L/S	82 L/S	-11 L/S (Conventional loco target reduced by 22 L/S)
7	WAG-9 Head Stock	39 L/S	47 L/S	31 L/S	42 L/S	+11 L/S

## **8.6 STATUS OF MPP & M&P SECTION.**

### **1. PLAN HEAD: 4100**

(i) INDENTS PLACED DURING THE YEAR 2013-14 (Position as on 01.01.14) :-

( From April 2013 to December 2013 )	COS	COFMOW	TOTAL
	07	Nil	07

(ii) MACHINES FOR WHICH P.O. DUE (Position as on 01.01.2014)

No. of Machines for which P.O. due		Total
COS	COFMOW	12
12	Nil	

(iii) P.O. PLACED DURING THE YEAR 2013-14 ( Position as on 01.01.14 )

COS	COFMOW	TOTAL
05	01	06

### **2. PLAN HEAD: 4200**

(i) INDENTS PLACED:- (Position as on 01.01.2014)

( From April 2013 to December 2013 )	COS	COFMOW	TOTAL
	Nil	Nil	Nil

(ii) MACHINES FOR WHICH P.O. DUE (Position as on 01.01.2014)

No. of Machines for which P.O. due		Total
COS	COFMOW	10
07	03	

(iii) P.O. PLACED DURING THE YEAR 2013-14 ó (Position as on 01.01.2014 )

P.O.PLACED	COS	COFMOW	TOTAL
	02	Nil	02

(iv) PROGRESS OF WORKS (M&P) :- ( as on 01.01.2014 )

Particulars	Total no. of m/cs. sanctioned	Dropped	Recd.	Under procurement
50 Loco Project :- Augmentation of facilities for enhancement in production capacity of 3-phase locos to 50 locos per year.(Total 11 items )	11	04	04	03
200 Loco Project :- Creation of addl. Facilities for enhancing the production capacity of CLW up to 200 locos per year.	30	04	20	06
275 Loco Project :- Modernisation & Augmentation of production capacity from 200 to 275 Elec.Loco per annum.	18	03	06	09
<b>TOTAL</b>	<b>59</b>	<b>11</b>	<b>30</b>	<b>18</b>

**3.Progress of works by M&P Deptt. (Position as on 01.01.2014)**

Particulars	M&Ps Received	M&Ps Under commissioning	M&Ps Commissioned.
M&P items sanctioned by Rly.Board under PH-41	03 ( from April to Decø13 )	09	09
GMø Out of turn items under Under PH-41	08 ( from April to Decø13 )	06	20
Project items ( 200 Loco Project & 50 Loco Project & 275 Loco Project . ) Under PH-42	03 ( from April to Decø13 )	03	06
<b>Total</b>	<b>14</b>	<b>18</b>	<b>35</b>

**Machines under Installation & Commissioning – 18 Nos. ( As on 01.01.2014 )**

(i) Plan Head ó 4100 ( M&P Prog.items)

S.N	Sanction	Case No.	Description, Qty & PO cost
1	M&P/ 07-08	MT/1879	Travelling Column Milling machine- 01no. <b>Cost ₹5.35 crore,.</b>
2	M&P 08-09	MT/1890	Robotic Welding Plant with manipulator <b>Cost ₹ 4.44 crores,</b>
3	M&P 05-06	MT/1748	High speed continuous Sand Mixer with Sand Reclamation plant-01 no Cost ₹ 2.8cr
4	M&P 09-10	MT/2052	Routine Test plant for testing 3-phase asynchronous motor-01 no. <b>Cost ₹ 2.32crore.</b>
5	M&P 09- 10	MT 2045	Electric Arc furnace, Cost ₹ 6.16 crores,
6	M&P 10- 11	MT /2095	Mig welding m/c ó 38 nos, Cost (188632 EURO x 71.56)= ₹ 1,34,98,505
7	M&P 10- 11	MT/2093	Mig welding m/c ó 30 nos, Cost (148920 EURO x 71.56) = ₹ 1,06,56,715
8	M&P 10-11	MT /2097	Axle grinding m/c. (Morara), <b>Cost ₹ 45744587.7 lakhs</b>
9	M&P 07-08	MT/ 1904	Plasma Cutting m/c. Cost ₹ 1.42 Crores.

(ii) PH-4100 ( GMø Out of Turn Items )

Sl. No	Sanction.	Case No.	Description, Qty. & PO Cost
10	OT/ 09-10	MT/2082	Centre Lathe- 01 no. Cost ₹ 9.42 lakhs,
11	GM 08-09	MT/1998	Radial Drilling m/c., Cost ₹ 21.75 lakhs
12	GM 08-09	MT 2003	Radial Drilling m/c. Cost ₹ 21.75 lakhs
13	GM/OT 09-10	MT/ 2069	Universal Testing m/c 100T., Cost ₹ 17.51 lakhs
14	GM / 08-09	MT / 2001	Air compressor 1000 CFM, ₹ 27.89 lakhs
15	GM / 11-12	MT/2147	Calibration system, ₹ 29.93 lakhs

(iii) Plan Head-4200

Sl. No	Sanction	Case No.	Description, Qty. & PO Cost
16	275 Loco	MT/AP/275/07	Axle Turning M/c, Cost ₹ 1.69 crores
17	275 Loco	MT/AP/275/08	Axle Turning M/c, Cost ₹ 1.69 crores
18	PH 42, 50 Loco	(MT/AP/50/048 )	Paint booth, ₹ 7.4679 crore

**8.7 Machines Commissioned – 35 Nos. (from April'13 to 01.01.2014)**

M&P Prog.Items ( PH-41 ) : -09 Nos.

Sl No	Item No. & Yr. of san.	Description & Qty.	MT No	Supplier's Name/A.T / PO no.	Consignee/ Location
1	M&P 06-07	CNC Vertical Turret Lathe, Max. Turning Dia.800mm, Cost ₹ 4.16 crore.	MT/ 1787	M/s. Premier Ltd./Pune, P.O no.05/ 2007/7068/90211 dt.01.12.2010.	Dy.CME/Mfg. , WS-09.
2	M&P 07-08	Advanced Fire Fighting system, cap.600Ltrs. /01no., Cost ₹24.04 Lakhs	MT/ 1932	M/s. Udyogi Plastic Ltd. Kol, P.O no.05/2007/ 7020/71756 dt.03.07.08	SC/RPF At CRJ
3	M&P 07-08	Loco lifting Hyd Jack	MT/ 1921	M/s. Hydrodyne, Sitarampur, P.O no.05/2007/7063/71763 dt. 21.08.09	Dy.CME/ ELA
4	M&P 09-10	Heavy Duty Universal machining Centre with automatic Pallet Changer-01no. Cost- Euro 14.4lakhs, Indian components- 35 lakhs	MT/ 2043	M/s. MAG India Industrial Automation Systems Pvt. Ltd., Bangalore, G-539 opened on 29.03.2010,	Dy.CME/ Mfg. HMS-09, bay-10
5	M&P 11-12	Truck, Cap-10T, 01 no., Cost ₹ 12.08 lakhs	MT/ 2129	M/s. Tata Motors Ltd., Mumbai, P.O no.05/2011/ 7003/91931 dt.07.12.2011	Dy.CME/MPP
6	M&P 11-12	Bus 32 Seater- 01 no.	MT/ 2128	M/s. Tata Motors Ltd., Mumbai, P.O no.05/2011/ 7004/91982 dt.07.12.2011.	AWM/TPT
7	M&P 11-12	Crane EOT-5T, 1 no., Cost ₹ 20.02 lakhs	MT/ 2134	M/s. Indiana Machine Tools, Mandigobindgarh, OP-2117	Dy.CME/Mfg.
8	M&P 11-12	Dumper Truck 10T, ₹16.18 lakhs	MT/ 2126	M/s. Tata Motors, P.O no. 05/2013/ 7001/ 01556 dated-20.03.13.	Dy.CME/MPP
9	M&P 12-13	500T Wheel Press. ₹ 276.93 lakhs	MT / 2148	M/s.A.J.Machine Tools, AT No. COFMOW, G-601	Dy.CME / Mfg.



GM Out of turn Items (PH-41):- 20 Nos.

Sl No	Item No. & Yr. of san.	Description & Qty.	MT No	Supplier's Name/A.T / PO no.	Consignee/ Location
10	GM OT/ 07-08	Combination therapy unit, 01 no.	MT/ 1972	M/s. International Electro Medical Co., NDLS, 05/2007/7099/71780 dt.17.09.08.	CMS/KGH
11	GM OT 08-09	S.J. Coil Winding machine-01no., Cost ₹ 5.99 lakhs,	MT/ 2026	M/s. TAMKAN, Asansol, P.O no. 05/2008/7114/71889 dt.17.02.10.	Dy.CEE/TMM
12	GM OT 08-09	Rad. Drilling m/c. Cost ₹ 21.75 lakhs	MT. 1999	M/s. Energy Tools, Gujrat, OP-1991 dt. 14.09.10	Dy.CME/Mfg.
13	GM OT 08-09	Hydraulic Crimping machine- 02 nos., Cost ₹ 9.36 lakhs.	MT/ 2035	M/s. Santragachi Engineering Co., Howrah, P.O no. 05/2008/71133/89774 dated-13.08.10.	Dy.CEE/EL
14	GM OT 08-09	Rotary Gellation Plant -02 nos Cost ₹ 17.64 lakhs	MT/ 2024	M/s. Heatem Engineering Co., P.O no. 05/2008/7115/89897 dated-14.09.2010.	Dy.CEE/ TMM, VPI shed, shop-23
15	GM OT/ 09-10	Digital Surge Comparison Tester with concomitant accessories- 04 nos Cost ₹ 16.13 lakhs	MT/ 2064	M/s. Vivid Metrawatt, Mumbai, P.O no.05/2009/7111/90824 Dt.28.03.11	Dy.CEE/ TMM, shop-23
16	GM OT/ 09-10	VCB Trolley 1250 Amps., 01 no. Cost ₹ 3.90 Lakhs	MT/ 2074	M/s. Allied Engineers, Kolkata P.O no.05/2009/7138/00603 dated-12.10.12.	Dy. CEE/M
17	GM OT/ 09-10	VCB Trolley 630 Amps., 06 nos, Cost ₹ 22.42 lakhs	MT/ 2076	M/s. Allied Engineering, Kolkata, P.O no. 05/2009/ 7139/00743 Dtd-12.11.12.	Dy. CEE/M
18	GM OT/ 09-10	Radial Drilling M/c. -1 no., Cost ₹ 18.3 lakhs	MT/ 2071	M/s. Energy Machine Tools Pvt. Ltd., Jamnagar, OP-2006 dated- 28.10.10	Dy. CME/ Mfg
19	GM OT 09-10	Cable fault locator, Cost ₹ 25.59 lakhs	MT/ 2077	M/S Bluemax Entreprise, Kolkata, P.O no.05/2012/ 7112/ 01602 dated- 10.04.2013	Dy.CEE(M)

20	GM OT 09-10	Spilt Casing Pump, -04 nos. ₹ 23.24 lakhs.	MT/2073	M/s.Electromechanical , Kolkata P.O.No.05/2009/7137/00171 dtd. 31.8.12.	Dy.CEE ( M )
21	GM OT/ 09-10	Induction Heater -01no., Cost ₹ 59.2 lakhs	MT/ 2080	M/s. Precision Instruments & Allieds, Mumbai, P.O no. 05/ 2009/7117/90713 dtd-15.03.11	Dy.CEE/TMM
22	GM OT 10-11	Autoanalyser , Cost ₹ 10.76 lakhs	MT 2122	M/s. Tulip Diagonistics Pvt Ltd, Goa, P.O no.05/2011/ 7119/ 92768 dated-13.12.12	CMS/KGH
23	GM OT 10-11	Radial Drill Machine- 01no. Cost ₹ 16.07 lakhs	MT/ 2101	M/s. Energy Machine Tools Pvt. Ltd. Jamnagar, OP-2094 opened on 21.10.11.	Dy. CME/ Mfg
24	GM OT / 11-12	ICU Ventilator, 01 no. Cost ₹ 16.19 lakhs.	MT/ 2142	M/s. Sigma Medical System, Kol, P.O no.05/2012/7110/01087 dated- 07.01.2013.	CMS/KGH
25	GM OT / 11-12	Defibrillator with Bedside Monitor, 01 no. Cost ₹ 2.37 lakhs	MT/ 2139	M/s. P. Bhogilal Inc. Kolkata, P.O no. 05/2012/ 7106/00950 Dtd- 11.12.12.	CMS/KGH
26	GM OT / 11-12	Spiro meter, Qty. 01 Cost ₹ 1.44 lakhs(P)	MT/ 2145	P.O no. 05/2012/7105/00698 dated- 30.10.12	CMS/KGH
27	GM OT / 11-12	Non-Motorised bed with mattress, 12 nos. Cost ₹ 8..33 lakhs	MT/ 2144	M/s. Vyas & Co., Asansol, P.O no.05/2012/7113/01037 dated- 24.1.2.2012.	CMS / KGH
28	GM OT / 11-12	Screw Air Compressor, 1000 cfm / Cost ₹ 27,51,785(S), 23,75,612(P)	MT/ 2138	M/s. Godrej & Boyce Mfg. Co. Ltd., Mumbai, OP-1908 dated- 03.09.2010.	Dy. CME/ Plant
29	GM OT 11-12	Remote Operated Multi- functional OT Table,	MT 2146	M/s. Janak Traders, P.O no. 05/2012/7107/00838 dt 22.11.12.	CMS / KGH

Project Items ( PH-42 ) ó 06 Nos.

Sl No	Item No. & Yr. of san.	Description & Qty.	MT No	Supplier's Name/A.T / PO no.	Consignee/ Location
30	50 Loco Project	Battery Charger set, 3 nos. Cost ₹ 6.79 lakhs	MT/ AP-050/ 046	M/s. Rayco Electro Enterprise, Kol, P.O no. 05/2009/7009/92175 dt.13.01.12.	Dy.CEE/EL
31	200 Loco Project	S.S. pipe cutting m/c.-02 nos. ₹ 7.45 lakhs.	MT/ AP- 200/ 030	M/s. Indo Tech Machines Pvt. Ltd. Indore, P.O no. 05/2007/ 7215/71895 dt.19.03.10	Dy.CME/ELA
32	200 Loco Project	Varnish Spary Booth	MT/AP 200/022	M/s. Bullows Paint Equipt. Mumbai P.O. No. 05/2007/7208/71806 dated. 24.12.08.	Dy.CEE/TMM
33	200 Loco Project	E.O.T crane, (Pendent Operated),	MT/ AP-200/ 032	M/s. Krane Mfg. (India) Pvt. Ltd.), Thane, P.O no. 05/2007/7220/ 71856 dt.11.08.2009	Dy.CEE/TMM , Bay-5A (Extension), 3-Phase Bay (VPI-III shed)
34	275 Loco Project	Auto Lister truck(10 nos), Cost ₹ 31.77 lakhs	MT/AP- 275/013	M/s. Godrej & Boycee, P.O no. 05/2012/7055/ 00881 dt. 30.11.12	Dy.CMM/ Depot
35	275 Loco Project	Induction Brazing Plant for rotor- 1 set	MT/AP- 275/04	M/s. VEL ELECTRONICS, Mumbai, PO no.05/2012/ 7056/02085 dated- 03.07.13.	Dy.CEE/TMM

## 8.8 Important M&Ps under acquisition.

i.	Commutator Tig Welding machine.	-	Traction Motor Shop
ii.	Horizontal Boring machine	-	Heavy Machine Shop.
iii.	Pipe Threading machine	-	Loco Assly. Shop.
iv.	Laparoscopic Gynaecological Instrument	-	K.G.Hospital.
v.	Video Gastroscope Colonoscope	-	K.G.Hospital.

## 8.9 Transport Shop :-

Transport Shop maintains all road vehicles consisting of passenger vehicles like cars, jeeps, mini buses etc. for movement of officials and industrial vehicles like forklifts, dumpers, tractors, platform trucks/ listers for movement of material inside and outside the shops.

Available Maintenance of Material handling equipments (as on 01.01.2014 ):-

FLT : 32 Nos.

PLT : 23 Nos.

Tractor : 02 Nos.

Truck: 06 Nos., Tripper- 03 Nos. Bus: 02 Nos.

Shunting Locos: 03 Nos.

Passenger Vehicles: 23 Nos. - Maintained through in-house and outside agencies.

## 8.10 Yard Organisation:-

For movement of traffic wagons, inward and outward departmental wagons and locomotive shell on dummy bogies, three shunting engines have been deployed. These locomotives are maintained and operated by Yard Staff. Yard Organisation also keeps liaison with the Asansol Division of E.Railway for movement of traffic wagons.

## 8.11 OVERVIEW OF STEEL FOUNDRY

Steel Foundry/CLW was set up in the year 1963 in collaboration with M/s F.H. Lloyd of United Kingdom for production of steel castings for Steam Locomotives produced in CLW/Chittaranjan.

Steel Foundry adopted state-of-the-art-technology provided by M/s Rockwell International Corporation, USA in the year 1990-91. Today Steel Foundry is independently capable of carrying out method design and developing moulding practices for any new product.

Steel Foundry/CLW has been accredited with CLASS-A0 FOUNDRY certificate by RDSO on 9<sup>th</sup> August 2012.

## 8.12 PRODUCT RANGE

### 8.12.1 STEEL CASTINGS:

#### Loco-items—

- Flexi coil Bogie for WAP-4 loco.
- Flexi coil Bolster for WAP-4 loco.
- Co-Co Bogie BG for WAG-5 & WDM-2 Loco.
- Suspension Tube for Hitachi TM.
- Suspension Tube for 3phase TM.
- Rotor Clamp for Hitachi TM.
- Commutator Spider for Hitachi TM.
- Centre Pivot for WAP-4 loco.

- Ballast Blocks for WAG-9 loco.
- Ballast Block for IGBT loco.
- Ballast Weights for WAG-7 loco.
- Loco Couplers for Electric loco.
- Striker Castings for Electric loco.
- -Eøtype Couplers for Diesel loco

**Wagon Items—**

- Casnub Bogie for BOXNHL wagons
- Casnub Bolster for 22HS/BOXNHL wagons
- Casnub Side Frame 22HS/BOXNHL wagons.
- Bogie Centre Pivot Top 22HS/BOXNHL wagons
- Bogie Centre Pivot Bottom 22HS/BOXNHL wagons

**C.B.Coupler Items—**

- Knuckle for CB Coupler.
- Coupler Body for CB Coupler.
- Yoke for CB Coupler.
- Striker Castings for CB Coupler.

**Spares for Zonal Railways—**

- Suspension Tube for WDM-3D loco.
- Wheels for Tower Car.
- Wheels for Power Car
- Wheels for Narrow Gauge Coaches.
- Wheels for Narrow Gauge loco.

**8.12.2 DEVELOPMENT OF NEW STEEL CASTING ITEMS:**

**(a) DEVELOPED & SUPPLIED REQUIRED TO RAILWAYS-**

- ❖ CB Coupler for Electric Locomotives
- ❖ Striker Casting for Electric Locomotives
- ❖ -Eøtype Coupler for Diesel loco

**(b) UNDER DEVELOPMENT-**

- ❖ Casnub Side Frame & Bolster for BLC Wagon
- ❖ GM bogie for DLW made WDG4 loco
- ❖ -Høtype Coupler for Diesel Loco
- ❖ Clevis for Coupler items



E-type Coupler for WDG-4 Loco

**8.12.3 FABRICATED ITEMS for LOCO:**

- Long Beam for WAP4
- End Structure for WAP4
- End Structure for WAG7
- End Box for WAG7



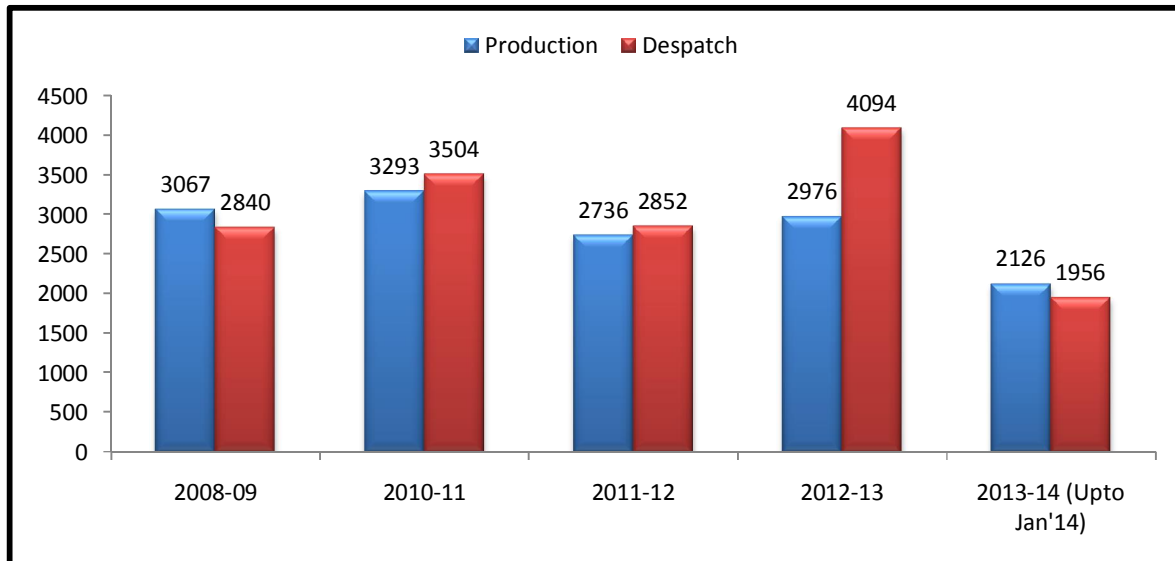
Cow Catcher

- Long Beam for WAG-7
- Roof Hatch Assembly for WAG-9/WAP-4 locos
- Head Stock for WAG-9/WAP-7 loco
- Centre Sill for WAG-9/WAP-7 loco
- Side Sill for WAG-9/WAP-7 loco
- Central Under Frame for WAG-9/WAP-7 loco
- Middle Box for WAG-7 loco

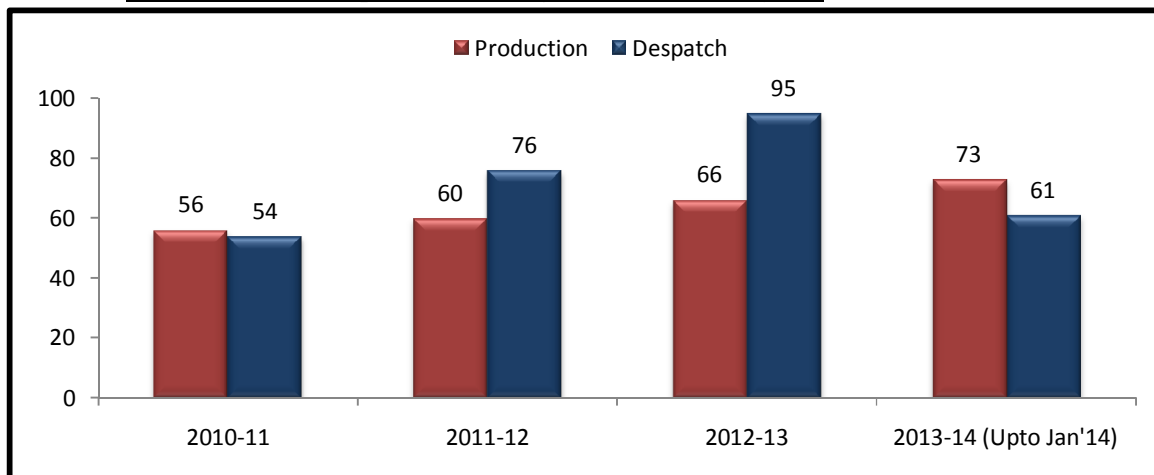


### 8.13 OUTTURN PERFORMANCE:

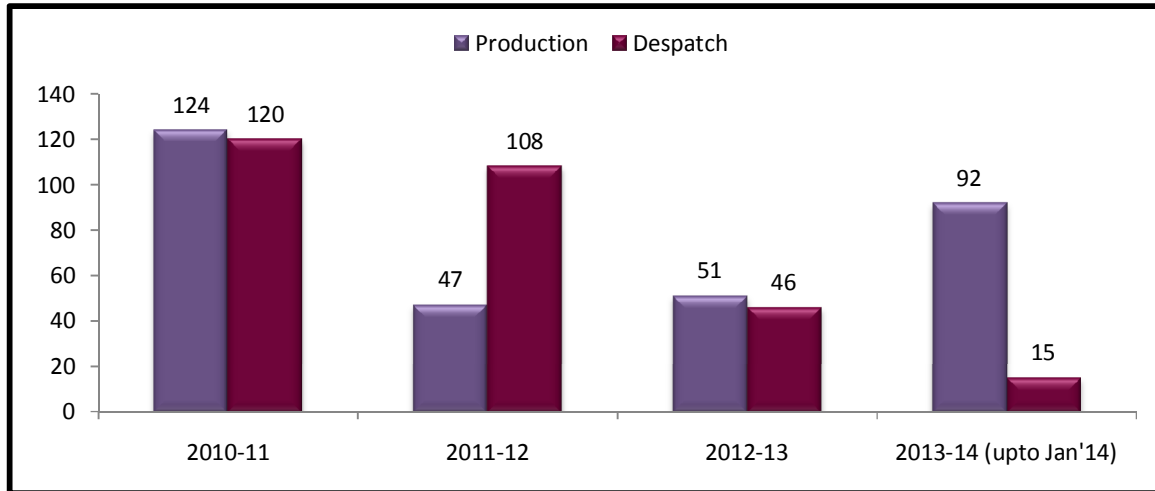
#### 8.13.1 Production & Despatch of Steel Castings over last five years



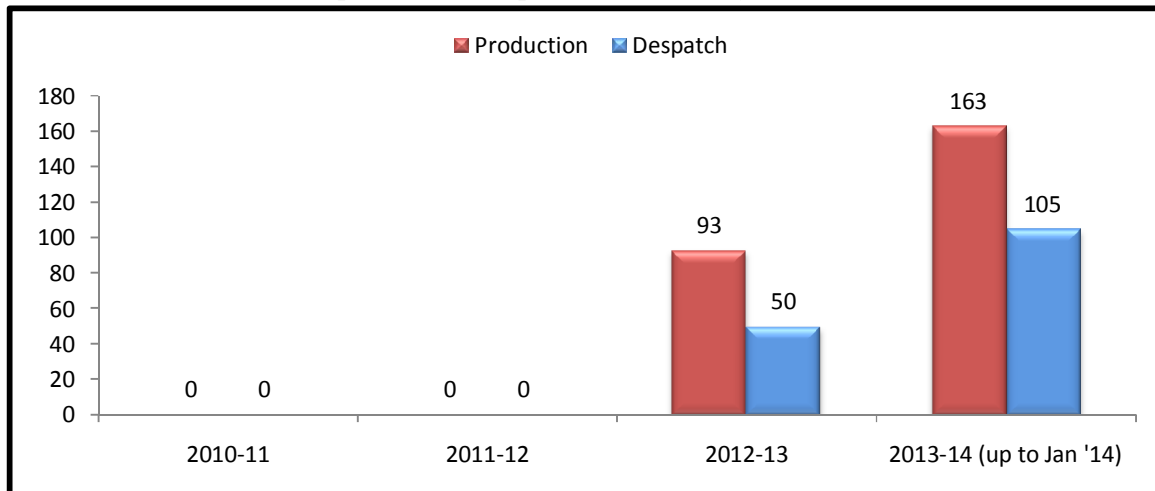
#### 8.13.2 Production and Despatch of FC Bogies over last Four years



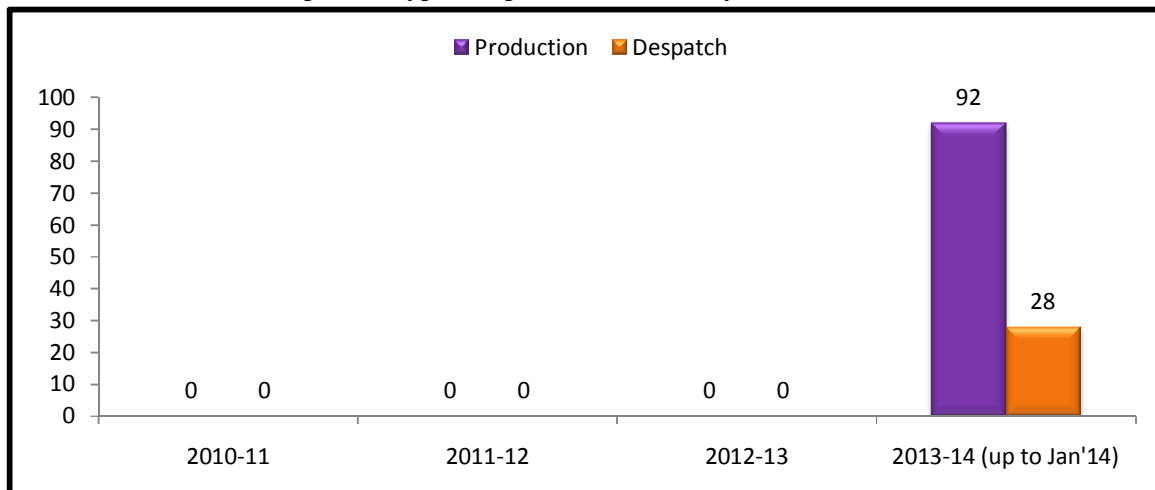
**8.13.3 Production & Desp. Of RIC Bogie Castings over last four years—**



**8.13.4 Production & Desp. Of Loco Coupler over last four years—**



**8.13.5 Production & Desp. Of E-type Coupler over last four years—**



#### 8.14 QUALITY:

Steel Foundry/CLW, despite following Green Sand moulding system, is endeavoring to contain the rejection level within 3%. Rejection percentage for the last 5 years is produced below which show that they are contained within the targeted limit.

Years	Total Cast (in MT)	Rejection (in MT)	Target	Rejection Percentage
2009-10	3529	84	3 %	2.38 %
2010-11	3362	69	3 %	2.05 %
2011-12	2736	56	3 %	2.05 %
2012-13	2976	64	3 %	2.15 %
2013-14 (up to Jan 14)	2126	43	3 %	2.02 %

#### 8.14.1 QUALITY ASSURANCE MEASURES:

(a) **Switching over to Metal Patterns/Core-boxes-**

With an objective to eliminate the casting defects owing to over-aged wooden patterns/core-boxes, induction of metallic patterns/core-boxes has been introduced.

In this regard, Hitachi Suspension Tube, Knuckle, Coupler Body etc. for locos & wagons, metallic patterns and core boxes have been procured from out agencies. The quality of the relevant castings pertaining to dimension and surface finish has been improved.

(b) **Mechanization of Foundry Process—**

Steel Foundry/CLW is in the process to adopt the Synthetic Sand Moulding System to overcome the casting defects like- sand inclusion, poor surface finish, blow holes etc. being induced by the existing Green Sand Moulding Practice.

(c) **Other Steps—**

In addition, following actions are being taken to improve upon quality/reduction in rejections

- Periodical checking of patterns & core boxes on quarterly basis.
- Use of exothermic sleeves to eliminate chances of shrinkage and cavities & to increase yield.
- Use of branded Zircon based mould washes to improve surface finish.
- Use of pouring ponds and tiles of high refractoriness in metal flow areas.
- Strict control over carbon boiling during melting to avoid pouring of gassy metals.
- Use of quick lime has been introduced to bring down phosphorous content of melt.
- Strict control on heat cycle during heat treatment of castings to achieve prescribed physical properties.
- 100% load testing of Bogies & Bolsters to improve reliability in service.

(d) **Customer Feedback—**

A pro-active step to call for the quality feed-backs from the customers has been initiated. All the customers are regularly being requested to provide feed-backs on the quality of items supplied from Steel Foundry/CLW. The reports have been analysed and appropriate corrective & preventive actions have been worked out, implemented and replied. Those railways, who have not responded, are being reminded regularly. The feed-backs are providing vital inputs for improvement in the quality and reliability of our products.



**8.15 PRODUCTIVITY:**

Load Lifted per Direct Worker The **Allowed Time Discharged per Direct Worker per Month** for the last 4 years has been as follows:

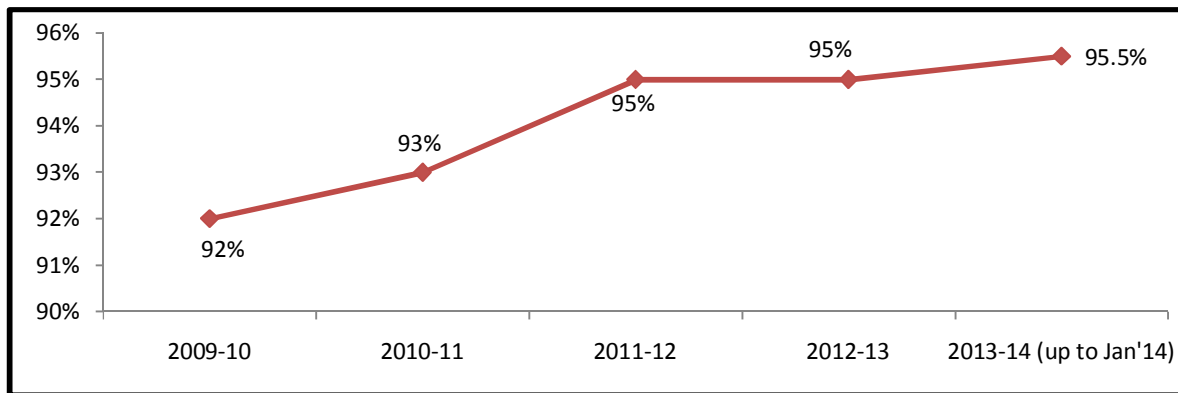
Years	2010-11	2011-12	2012-13	2013-14 (up to Jan'14)
AT Discharged	250 hrs.	246 hrs.	253 hrs.	260 hrs.

**8.16 PLANT MAINTENANCE ORGANISATION:**

Steel Foundry has total no. of 390 M&Ps. The breakdown as well preventive maintenance of all the 390 Nos. of M&Ps carried out by Plant Maintenance consisting of Millwright Section (MTS-63 Shop) & Electrical Repair Shop (ERS-64). Plant maintenance organization deals with the re-conditioning, re-engineering, retro-fitment of the machinery & plant, installation of new machinery & plants, condemnation and uprooting of old M&Ps are also carried out by these sections.

AVAILABILITY OF CRITICAL M&PS

Availability of critical M&Ps for production for the last five years is depicted below.



**Annexure IV**

**CONSOLIDATED LIST OF PENDING WARRANTY FAILURE CASES FOR CONVENTIONAL  
LOCOS (As on 31.3.13)**

Sheds	CR	ECoR	ECR	ER	NCR	NR	SCR	SECR	SER	SR	WCR	WR	Total
BSL	70												70
AQ													
ANGL		401											413
VSKP		12											
WAT													
GMO			27										39
MGS			12										
HJP													
HWH				18									28
ASN				9									
KPA				1									
CNB					31								46
JHS					15								
GZB						4							19
LDH						15							
CB													151
KZJ							34						
LGD							45						
BZA							72						
BIA								105					106
BSP								1					
BNDM									157				317
SRC									109				
TATA									51				
KGP													43
AJJ										29			
ED										14			
PER													181
ET											122		
NKJ											48		
TKD											11		
BRCY												21	21
BL													
DHD													
Total	70	413	39	28	46	19	151	106	317	43	181	21	1434

## Annexure IV contd.

## CONSOLIDATED LIST OF PENDING WARRANTY FAILURE CASES FOR 3-PHASE LOCOS (As on 31.3.13)

Sheds	CR	ECOR	ECR	ER	NCR	NR	SCR	SECR	SER	SR	WCR	WR	total
BSL	4												21
AQ	17												
ANGL													
VSKP													
WAT													44
GMO			42										
MGS													
HJP			2										
HWH													
ASN													
KPA													
CNB													
JHS													68
GZB						68							
LDH													
CB													
KZJ													563
LGD							563						
SC													
BZA													
BIA								348					359
BSP								11					
BNDM													36
SRC													
TATA									36				
KGP													
AJJ													65
ED													
PER													
ET													
NKJ													65
TKD										65			
BRCY													
BL													
DHD													1156
total	21		44			68	563	359	36		65		

9

# STAFF POSITION

## 9. STAFF BREAK UP

STAFF BREAK UP DEPARTMENT WISE Gr. C & D (AS ON 31.12.13):

DEPARTMENT	SANCTIONED STRENGTH	STAFF ON ROLL	VACANCY
<b>ACCOUNTS</b>			
GROUP 6C	502	330	172
GROUP 6D	43	58	-15
Total	545	388	157
<b>ADMINISTRATION</b>			
GROUP 6C	619	454	165
GROUP 6D	245	251	-6
Total	864	705	159
<b>CIVIL</b>			
GROUP 6C	398	266	132
GROUP 6D	494	441	53
Total	892	707	185
<b>ELECTRICAL</b>			
GROUP 6C	2774	2161	613
GROUP 6D	455	503	-48
Total	3229	2664	565
<b>MECHANICAL</b>			
GROUP 6C	5862	4952	910
GROUP 6D	1053	1019	34
Total	6915	5971	944
<b>MEDICAL</b>			
GROUP 6C	200	151	49
GROUP 6D	420	249	171
Total	620	400	220
<b>PERSONNEL</b>			
GROUP 6C	299	282	17
GROUP 6D	0	0	0
Total	299	282	17
<b>RPF</b>			
GROUP 6C	508	389	119
GROUP 6D	27	23	4
Total	535	412	123
<b>S &amp; T</b>			
GROUP 6C	41	35	6
GROUP 6D	12	14	-2
Total	53	49	4
<b>STORES</b>			
GROUP 6C	632	449	183
GROUP 6D	395	249	146
Total	1027	698	329
<b>GRAND TOTAL</b>			
<b>GROUP - C</b>	<b>11835</b>	<b>9469</b>	<b>2366</b>
<b>GROUP - D</b>	<b>3144</b>	<b>2807</b>	<b>337</b>
<b>TOTAL</b>	<b>14979</b>	<b>12276</b>	<b>2703</b>

10

# UNIT COST OF THE PRODUCT

## 10. UNIT COST OF THE PRODUCTS

(Figures in thousands of Rs.)

### a. 2010-11

Type of Loco	Direct Labour	Direct Materials	Over heads	Total(ex. Pro. Chgs.)	Pro. Charges	Total(in pro.charges)
WAP-4	42,60	4,20,38	1,39,72	6,02,70	9,04	6,11,74
WAG-7	36,15	4,50,31	1,20,44	6,06,90	9,10	6,16,00
WAG-9	55,29	11,05,36	1,92,97	13,53,62	19,63	13,73,25
WAP-7	55,29	11,32,79	1,93,10	13,81,18	20,02	14,01,20
WAP-5	55,29	11,54,61	1,93,54	14,03,44	20,35	14,23,79

### b. 2011-12

Type of Loco	Direct Labour	Direct Materials	Over heads	Total(ex. Pro. Chgs.)	Pro. Charges	Total(in pro.charges)	ED	Total (in.ED)
WAP - 4	4098	53558	11744	69400	1041	70441	700	71141
WAG-7	5001	50068	14031	69100	1036	70136	700	70836
WAG-9	5529	110536	19335	135400	1936	137363	1400	138736
WAP-7	5529	113279	19292	138100	2002	140102	1400	141502
WAP-5	5529	115461	19310	140300	2035	142335	1400	143735

### c. 2012-13

Type of Loco	Direct Labour	Direct Materials	Over heads	Total(ex. Pro. Chgs.)	Pro. Charges	Total(in pro.charges)	ED	Total (in.ED)
WAP - 4	4098	53558	11744	69400	1041	70441	1400	718411
WAG-7	5001	50068	14031	69100	1036	70136	1400	71536
WAG-9	5529	110536	19335	135400	1963	137363	2800	140163
WAP-7	5529	113279	19292	138100	2002	140102	2800	142902
WAP-5	5529	115461	19310	140300	2035	142335	2800	145135

### d. 2013 – 14 (upto31.12.13)

Type of Loco	Direct Labour	Direct Materials	Over heads	Total(ex. Pro. Chgs.)	Pro. Charges	Total(in pro. charges)	ED	Total (including ED)
WAP-4	3914	52800	11886	68600	1029	69629	1400	71029
WAG-7	4413	51856	12331	68600	1029	69629	1400	71029
WAG-9	5642	101094	18064	124800	1810	126610	2800	129410

WAP-7	5225	104136	16039	125400	1881	127281	2800	130081
WAP-5	5310	112428	16462	134200	2013	136213	2800	139013

11

# INDUSTRIAL SAFETY



## 11. SAFETY ORGANISATION

Safety Officer & Safety Inspectors regularly check the safety aspect in the shop floor such as use of Personal Protective Equipment, proper use of Material Handling Equipment, unsafe working practices etc. They also conduct safety inspections, investigations of accidents and recommended remedial measures. They also formulate plans for motivating staff for safety consciousness, use of safety equipment and compliance of statutory act and regulations.

To monitor Occupational Health Hazards, periodical Medical Check-up is done by Medical Department as per statutory regulation. Safety department in co-ordination with Medical Department frames the programme and maintain the records of the tests. It also maintains liaison with State Pollution Control Board. Environmental Engineers of WBPCB from Asansol & Kolkata regularly visits Steel Foundry/ CLW/Chittaranjan. Safety department with the help of approved agencies of WBPCB conducts regular tests of air and sound.

### 11.1 INDUSTRIAL SAFETY:

#### Accident Statistics of CLW during the last 5 years i.e 2008-09,2009-10,2010-11,2011-12,2012-13

Sl. No.	Year	No. of Accidents	Type of injury		
			Fatal	Major	Minor
1	2009	08	02	06	-
2	2010	09	01	07	01
3	2011	06	-	06	-
4	2012	07	-	07	-
5	2013	10	01	07	02

### 11.2 Measures taken for Improvement:

i. All the Shops and work sides are regularly inspected for "Plant Safety Inspection". All plants using flammable substances like acetylene and LPG etc. are inspected regularly and plant maintenance/operation units follow fire proof working procedures for safe operation and maintenance of these plants. Contractors engaged for maintenance of acetylene/oxygen/LPG plants are monitored regularly by Safety Units. Fire Prevention measures - like use of Flash back arrestor in acetylene cylinder and declaration of fire prone area as "NO SMOKING ZONE", rigorous training of staff by fire inspectors, demonstration of fire-fighting equipment at the working sites, regularly re-filling/repair of fire extinguishers are being followed for vulnerable zones. All the accident/dangerous occurrences are investigated and section/persons responsible are pinpointed and remedial measures taken to minimize such incidents.

ii. Regular checking is carried out in production shops regarding use of Personal Protective Equipment like Safety Shoes, Goggles, Helmet, Nose mask etc. Staffs are continuously motivated to wear PPEs and also apprised of the resultant hazards associated with non-use of such equipment.

iii. A proper vigil is regularly maintained to determine whether all critical equipments like Crane, chain, Pressure Vessel etc. are tested as per the Statutory Rules by the agencies approved by the State Inspectorate of factories. Do's and Don'ts for safe operation of crane has been circulated to concerned shops.

iv. Crane Drivers, Riggers, staffs engaged for Spray Painting, Electroplating, Battery Charging, Foundry work, operation and signaling to the cranes etc. are given regular medical check up to assess their vision, chest, lung function etc. in compliance with the statutory obligation.

v. Safety calendars, posters procured by safety deptt. are displayed at shop floor for safety awareness among the workers. As per the relevant provision of Factory Rules 1958, Safety and Health Policy of CLW has been prepared duly signed by the CME and occupier and displayed the same in various locations through laminated boards. Staff are regularly counseled by the Chief Safety Inspectors / Safety Inspectors to adopt safe practices while they are at work.

vi. Fume Extraction System has been installed in shop no 26. The system is effective to extract the welding fumes arising out of welding operation thus maintaining upgraded environmental standard in the shop floor as well as to prevent the workers from being afflicted with any irreversible diseases by inhalation of the fumes.

vii. The safety action plan pertaining to various operations being carried out inside the factory premises has been chalked out and the same has already been distributed to all stake holders to ensure strict compliance of the same to user in safe practice while performing the respective job.

viii. Work-shop on safety are being held in collaboration with TTC where demonstration is made by Safety Deptt. with the aid of audio-visual mode based on the video footages filmed during the working hours to admonish the staff about the various processes of un-safe act and also an inter-active session is conducted in the work-shop to encourage participation by the workers.

ix. Plant Safety Audit and Work Area Monitoring have been conducted by the expert agency approved by the Inspector of Factories in different areas inside the Factory premises. The deficiencies found in course of the above work have been pointed out and the same have been brought to the notice of concerned authorities to make necessary rectification.

12

# FUTURE PLANS

## **IMPORTANT WORK PLAN DURING 2013-14**

1. One No. Universal Tensile Testing Machine, capacity 100 ton was procured through M&P (2012-13) & commissioned in Lab Loco.
2. Procurement of Vicker Hardness Tester through M&P(2012-13) under GMø's Out of Turn & P.O has placed, expected commissioning of Vicker Hardness Tester in the mid of the February 2014.
3. Procurement of Magnetic Particle Testing (MPT) Equipment through M&P(2012-13) case is under process.
4. M&C Laboratory of Main Lab Loco &SF Lab is in a project stage of computerization, upgradation of online test reporting system.
5. 500 Ton Hydraulic Pull Load Testing M/c is under procurement for high tensile CBC coupler & its components as per RDSO Specification 56BD07 & 48BD08 & E-Coupler &H-type Coupler for DLW.

13

# OTHER ISSUES

## 13 Other issues

- Up to Dec 2013, CLW has turned out 204 locos over and above against proportionate target of 203. The production of 3-phase locomotives is highest in current year. CLW has produced 106 three phase loco in current financial year upto Dec. compared to 110 in complete last financial year.
- CLW in the past has never turned out more than 8 three phase locos in any month. The capacity has been now stabilized to 14-15 per month.
- The manufacturers of three phase loco equipment have stepped up their production to meet the enhanced requirements. The assistance from Board in this regard is highly appreciated.

Chittaranjan Locomotive Works had been sanctioned "Creation of additional facilities for enhancement of production capacity up to 200 locomotives per year" at the estimated cost of Rs.92.51 Crores at first step. The major works are

- Additional Bay of Loco Fabrication Shops.
- Extension of Traction Motor Shops.
- Additional Machinery & Plant, Tools, Jigs & Fixture
- Production Control Information Management System
- Augmentation to various Ancillary Shops

The work was completed by June 2013 to enable CLW with higher productivity and step forward towards producing more 3-phase Locomotive.

The anticipated cost for augmentation capacity to achieve 275 locomotives per year in second phase is Rs.134 crores. The work is scheduled to be completed by June 2014.

- Dankuni project of CLW - Cost of the project is 270.77 Crores. The work is scheduled to be completed by June 2014.

भारतीयरेल  
INDIAN  
एचआरंजनरेलइंजनकारखाना  
CHITTARANJAN LOCOMOTIVE WORKS

RAILWAYS



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सं जी एम डाल्यू 137 भाग XXI

No. GM/W/137 Pt. XXI

Date: .08.2013 .

एनदेशक यांअक इं (उ इ) Director Mech. Engg. (PU)

रेलवे बोड Railway Board

रेल मंअलय Ministry of Railways,

कमरा सं 322/बी Room No.322/B,

नई एअलअ New Delhi-110001 .

एषय: उअपादन ईकाई का एअडडअनोट , एअरेका 31.03.13 तक ।

Sub: Standard note for Production Unit, CLW as on 31.03.2013.

संदभअ बोडअका एअनांक 16.7.2013 का पअ सं 2013/एम(पी यू)/4/1 ।

Ref: Board's letter no. 2013/M (PU)/4/1 dt.16.7.13.

एअडडअनोट 31.3.2013 तक कअ बीस एअतयां धारक एअवारा एअषत कअ जा रहअ हअ ।

Twenty copies of the Standard note as on 31<sup>st</sup> March, 2013 is being sent with the bearer of this letter.

उप महाअबंधक

1

## **INTRODUCTION**

### **1. INTRODUCTION :**



- 1.1 The Works and Administrative office of Chittaranjan Locomotive Works (CLW) are located at Chittaranjan, Dist. Burdwan in West Bengal. In addition, there is a Stores Purchase office in Kolkata and CLW's inspection cells in New Delhi, Mumbai, Kolkata and Bangalore.
- 1.5 Chittaranjan Locomotive Works (CLW) is the first industrial gift to free India by the planners of this nation. The issue of setting up a locomotive building unit continued to be under active consideration of the Central legislature and in the late thirties, a committee consisting of M/s Humphries and Srinivasan was appointed to investigate the possibility of establishing a locomotive manufacturing unit and to consider its economic viability. The initial project at Chandmari, a place near Kanchrapara in the state of West Bengal, could not mature due to partition, which inevitably necessitated a change of site. The present site of Chittaranjan was selected after a fresh survey and Railway Board's approval was obtained in the year 1947. The locoworks was initially established for production of 120 average sized steam locomotives with the capacity to manufacture 50 spare boilers. Production of steam loco commenced on 26<sup>th</sup> January, 1950. The first President of India, Dr. Rajendra Prasad dedicated the first steam locomotive to the nation on 1<sup>st</sup> November, 1950 and on the same day the factory which was called Locomotive Manufacturing Works, was named after the great Patriot, Deshbandhu Chittaranjan Das. Production of Diesel Locomotive was taken up during 1968. After manufacturing 2351 Steam Locomotives of 5 types and 842 Diesel Locomotives of 7 types, production of Steam and Diesel Locos were discontinued from 1971-72 and 1993-94 respectively. CLW is now manufacturing main line Electric Locomotives only. Upto 31.12.13, 5132 Electric Locomotives have been produced of different class (AC/DC, AC, DC & 3- phase).
- 1.6 CLW has augmented its production capacity for Electric Locos in phases besides absorbing 3-phase technology i.e from 60 to 80 Locomotives, 80 to 100, 100 to 130 and 130 to 150.
- 1.7 Production of Traction Motors and control equipment commenced in April 1967. In the year 2012-2013, 1537 TM were produced.
- 1.5 Steel Foundry was set up in 1962-63 for production of steel castings for Steam Locomotives produced in CLW. It took up production of castings with the State of the Art technology provided M/S Rockwell International Corporation, USA in the year 1990-91.
- 1.9 CLW has in house facilities for machining and assembly of wheel sets, fabrication and machining bogies. The facilities include modern CNG machines, Plasma Cutting machines, Inert Gas Welding etc.
- 1.10 CLW has an exclusive Centre for Design and Development with CAD/CAM facilities.
- 1.11 There is a well-established quality assurance/inspection for incoming material and stage inspection and final inspection of the CLW manufactured items.
- 1.9 CLW has been sanctioned "Creation of additional facilities for enhancement of production capacity". The major works are:
6. Additional Bay of Loco Fabrication Shops.
  7. Extension of Traction Motor Shops.
  8. Additional Machinery & plant, Tools, jigs & fixture.
  9. Production control Information Management System.
  10. Augmentation to various Ancillary Shops.
- 1.10 CLW has acquired the ISO-14001 certificate on 26.4.2002 both for its works and township for a neat and clean environment.
- 1.11 Chittaranjan is a true example of Environment preservation and consciousness. Its lush green ambience talks of the efforts of the Administration as well as the residents of the township in the conservation of Environment, as well as using of all the existing natural resources in an eco-friendly manner. The concerted and unending efforts have been rewarded immensely by the World Environment Foundation and **the Golden Peacock award for Environment Management 2006 had been conferred on 9<sup>th</sup> June 2006.**
- 1.12 CLW has complied fully with the provisions of the Industrial Safety Act, 1948. CLW in its safety policy aims to ensure 100% safety for all workers working in Chittaranjan Locomotive Works. CLW is the proud

recipient of the Safety innovation award 2006. The award was conferred on CLW on 6<sup>th</sup> September, 2006 by the Safety and Quality forum of the Institute of Engineers (India).

1.13 The 2<sup>nd</sup> IGBT technology based WAG-9i Class Freight loco No. 31234 has been successfully commissioned on 15<sup>th</sup> April, 2010. The first electric locomotive (WAP-7 type no. 30277) with Head on Generation (HOG) scheme was flagged off on 30<sup>th</sup> June, 2010.

1.14 The first WAP-7 loco no. 30279 was produced with brake rigging of WAP-7 design.

**1.15 Inauguration of e-Auction in CLW.**

E-Auction was started in Chittaranjan Locomotive Works (CLW) on 24-01-2013 . Shri Radhey Shyam, General Manager, CLW inaugurated this system with the mouse click on the CLW Website . This is the first time that e-auction process was started in CLW . This has conducted the e-auction process online through the IREPS (Indian Railways Electronic Procurement System) website of Indian Railways.

**1.16 All India Railway Bridge Championship in CLW.**

The 35<sup>th</sup> All India Railway Bridge Championship, 2012-13 got underway at Chittaranjan Locomotive Works on 05-03-2013. A total of 38 participants from ER, SER, Metro, CR and CLW were participated in this all India level competition which was continued up to 8<sup>th</sup> March. Top ranking national level players vied for top spots in three different events , namely Swiss Event for team championship, Pairs and Board A match.

**1.18 Installation of PCMIS Facility in CLW**

In another successful attempt to modernize its day-to-day activities ,Chittaranjan Locomotive Works (CLW) has installed PCMIS package recently,during March 2013. This facility will revolutionize procurement and updating procedure in CLW. The package was handled by EDP Centre/CLW and developed by Ms. CMC Ltd.

**1.18 CLW'S ALL TIME HIGH RECORD LOCO DISPATCH**

Chittaranjan Locomotive Works (CLW), the premier electric loco production unit of Indian Railways, has achieved ever highest production of 270 locomotives in the year 2012-13. Thus not only surpassed the Railway Board's target but also last year production figure of 258 locomotives, which was so far the best ever annual production in the history of this unit . CLW has made quantum jump in production of 3-phase electric locomotives from 76 nos in 2011-12 to 110 nos in 2012-13, an increase of 45% over last year.

**1.19 Celebration of Kaviguru Rabindra Jayanti in CLW.**

The Birth Anniversary of Kavi Guru Rabindra Nath Tagore was celebrated on 9<sup>th</sup> May 2013 at the Chittaranjan Club in Chittaranjan Locomotive Works. Shri Radhey Shyam, General Manager/CLW paid floral tribute on the portrait of Kavi Guru and inaugurated the programme by lighting the traditional lamp as Chief Guest.

**1.20 Inauguration of Ventilator Machine and distribution of hearing aids in KG Hospital /CLW.**

A ventilator machine was inaugurated by Shri Radhey Shyam, General Manager/CLW, in the Kasturba Gandhi Hospital of Chittaranjan Locomotive Works (CLW) on 24-06-2013. On the occasion,some hearing aids were distributed to the needy patients of CLW by Shri Radhey Shyam, General Manager.

**1.21 CELE's Coordination Conference in CLW.**

An one day co-ordination meeting on customer feedback was held at Chittaranjan Locomotive Works (CLW) on 29<sup>th</sup> June,2013 amongst the Chief Electrical Loco Engineers ( CELEs ) & Sr. Divisional Electrical Engineers ( Sr. DEEs ) of ten (10) participating railways to discuss how to improve the reliability of the CLW built 3-phase electric locomotives .The meeting was formally inaugurated by Shri Radhey Shyam, General Manager , CLW on 29<sup>th</sup> June,2013 in the Administrative office meeting room.

**1.22 Best ever production performance in first quarter.**

Chittaranjan Locomotive Works( CLW), a premier electric loco production unit of Indian Railways, has excelled in loco production by rolling out an all time high latest technology electric locomotives in its first quarter of 2013-14. Overall loco production has witnessed a quantum jump of about 25 % in the first quarter of current financial year 2013-14 in comparison to same period of 2012-13 . CLW has been able to produce a total of 69 electric locos in the said period of this fiscal in comparison to 55 locomotives in 2012-13 . The production of three-phase locomotive was only 11 during the first quarter of 2012-13 and it has crossed 27 in the same period of 2013-14 and thus recorded a leap of about 150 %.

In another development , CLW has also improved the production of traction motors, for providing motive power to the locomotives. In the first quarter of 2013-14, about 30 % increase has been recorded in the production of three-phase traction motors as it has produced 228 TMs in this quarter in comparison to 175 of the corresponding period of last year..

### **1.23 inauguration of new CNC Vertical Torret Lathe Machine**

In order to enhance the production capacity of Wheel Shops in Chittaranjan Locomotive Works (CLW), a CNC Vertical Turret lathe machine was commissioned and inaugurated by Shri Radhey Shyam, General Manager / CLW on 17-07-2013 inside the workshop. This machine, installed at a cost of Rs.4.16 crores, will help in enhancing the production of wheel assembly for more electric locomotive production from CLW.

### **1.24 inauguration of new Auto-Analyzer Machine in KG Hospital/CLW**

An Auto Analyzer machine was inaugurated by Shri Radhey Shyam, General Manager/CLW, in the Kasturba Gandhi Hospital premises of Chittaranjan Locomotive Works (CLW), on 17-07-2013. It is expected that, this machine which is installed at a cost of Rs.10 lakhs., will help in getting the auto analysed blood test reports of CLW employees and their family members. It is to be noted that, the KG Hospital is adapting newer technology in providing better health services to the inhabitants of CLW.

### **1.25 Production & flagging off of 100<sup>th</sup> Locomotive of the year 2013-14 in CLW.**

The 100<sup>th</sup> Electric Locomotive of the year 2013-2014 of Chittaranjan Locomotive Works, bearing no.312410 ( WAG-9H) was inaugurated and dedicated to the service of the Nation on 14-08-2013 by Sri Radhey Shyam, General Manager, CLW in a simple ceremony held inside the workshop. It is worth mentioning here that CLW produced 100 electric locomotives in this year in comparison to the 83 electric locomotives produced during the corresponding period of last year.

### **1.26 VISIT OF MEMBER ELECTRICAL , RAILWAY BOARD TO CLW**

Shri Kul Bhushan, Member Electrical, Railway Board & Ex-Officio Secretary to Govt. of India visited Chittaranjan Locomotive Works (CLW) on 9<sup>th</sup> Sept 2013 . During his visit to the workshop, Multi operation high speed 3 - phase passenger locomotives of WAP-5 type bearing loco no. 30069 & 30070 were ceremonially flagged off by Shri Kul Bhushan , Member Electrical & Shri Radhey Shyam , GM, CLW for inclusion in the fleet of Indian Railways .

Shri Kul Bhushan also inaugurated a Newly built Shed in Test shop under AP-275 project at a cost of Rs 3.47 crores to accommodate more locomotives and a CNC Universal Machining Centre inside Heavy Machine Shop for complete machining of 3-phase stators at a cost of Rs 10 crores .

### **1.27 Cultural Festival “ AAROHAN 2013 “ In Chittaranjan**

A Cultural Festival named "AAROHAN 2013" was organized by the Chittaranjan Locomotive Works Cultural Association (CLWCA) on 4<sup>th</sup> & 5<sup>th</sup> Nov 2013 at Rabindra Manch premises ..

**1.28 4<sup>th</sup> All India Railway Archery Championship 2013-14 in CLW.**

The 4<sup>th</sup> All India Railway Archery Championship 2013-14 was held at the Oval Ground on 18<sup>th</sup> December 2013. Shri Gurdev Singh, Financial Adviser and President, CLWSA inaugurated the meet as Chief Guest. This Championship lasted till 20<sup>th</sup> December comprising of Events of both Men & Women categories. The participating teams includes DMW/Patiala, S.C.Railways, N.F.Railways, E.Railways, S.E.C.Railways and CLW/Chittaranjan being the host team. The Championship was organized in six categories namely; Recurve Men, Recurve Women, Compound Men, Compound Women, Recurve Men Individual and Recurve Women Individual.

2

## SALIENT FEATURES

### 2. SALIENT FEATURES

Salient features of CLW w.r.t the following :

**2.1 Total turn over as on 31.12.13**

a) For Indian Railways : Rs.2303.86 Crores

b) For others : --

**Turn over ratio as on 31.12.13 – (-)17%**

**Break up of Turnover as on 31.12.13**

Supply of Locos including TOT Rs. 2051.34 Crores  
 Components manufactured for stock Rs. 241.44 Crores  
 Supply of Spares for Zonal Railways Rs. 11.08 Crores

í í í í í í í

**TOTAL Rs: 2303.86 Crores**

Turn over ratio of Store Deptt./CLW for 2012-13 upto Dec013 : 55.56%

**2.3 Total assets : (as on 31.12.13 ) : Rs. 725.90 crores**

c. **Fixed assets: (as on 31.12.13 ) : Rs. 318.68 crores**

C) Township : Rs.27.37 crores

D) Workshop with M&P : Rs. 291.31 crores

d. **Floating assets (as on 31.12.13 ) : Rs. 407.22 crores**

D) Stores : Rs. 843.16 crores

E) WMS : Rs. (-) 454.45 crores

F) Misc Adv. : Rs. 18.51 crores

**2.3 Sanctioned and on-roll position of staff as on (01.01.2014) group of staff wise i.e Group A, Group B, Group C & Group D.**

Group	Sanctioned Strength	On Roll
Group A	240	104
Group B		79
Group C	11835	9469
Group D	3144	2807

**2.8 Elec. Power requirement (average maximum demand) : 11MVA**

**2.9 Electric energy consumption : (in lakh units/year) : 456.70194 Lakh unit (from 1<sup>st</sup> January,2013to 31<sup>st</sup> December 2013.**

**2.10 No. of H.T. Sub station: A) 33/11 KV :01 no.**

B) 11/3.3KV : 01no.

C) 11/0.4KV : 45 nos.

D) 11/0.4KV : 21 nos.- under main shop.

**2.11 Stand by power generation capacity(in KW) : 8037.50 KWH(as on 31.12.2013)**

**2.8 Water consumption (in lakh litres/Day) : 150 Lakhs/l./Day**

**2.9 Workshop Land(In hectares) : 100.44 Hectares.**

**2.10 Township area : 1834.441 Hectares.**

**2.11 (a) Covered area in shops (in SQM) : 239843 SQM**

(b)Covered area of other service building (in SQM) : 35241 SQM

**2.12 (a)Total staff as on 31.12.13 : 12276 Nos.**

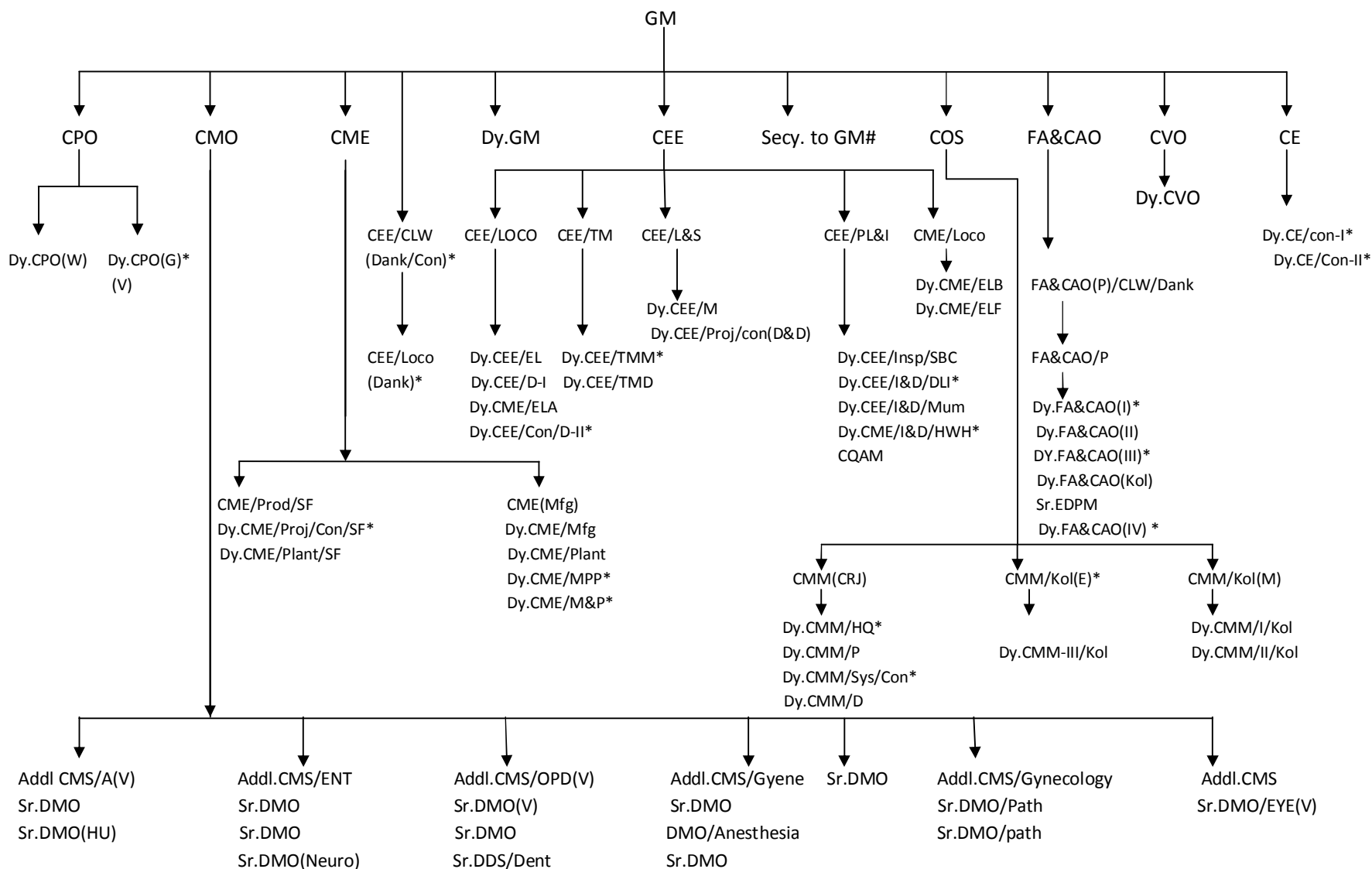
(b)Total number of staff quarters : 9346 Nos.

**2.13 Hospital (no. of beds) : 197 Nos.**

3

# **ORGANISATIONAL CHART**

# ORGANISATIONAL CHART (UPTO JAG) AS ON 01.01.14 .



Note: - # (Elect. Cadre) \* (W/C) V- Vacant.



4

# **PRODUCTION PERFORMANCE**

## 4. PRODUCTION PERFORMANCE :

CLW built 2351 Nos. of Steam Locomotives and 842 Nos. of Diesel locomotives before switching over completely to the production of Electric Locomotives. The last Steam Locomotive was built in the year 1971-72. The production of Diesel locomotives continued up-to 31<sup>st</sup> March 1993 when the last ZDM-5 Narrow Gauge Loco was turned out. Now CLW is involved in the production of Electric Locomotives (Conventional and Three phases) and has produced 5132 Electric locomotives till 31<sup>st</sup> Decø2013and maintenance spares required by Zonal Railways. The annual out-turn of various types of Locomotives CLW has produced since inception is given in the Annexure-V in two sheets.

### 4.1 **ELECTRIC LOCOMOTIVES :**

The production of Electric Locomotives was started in the year 1961. Till 31<sup>st</sup> Decø 2013, 5132 nos Electric Locomotives of various classes and traction have been produced as shown in the Annexure-III in two sheets.

The present production of electric locomotives consists of:

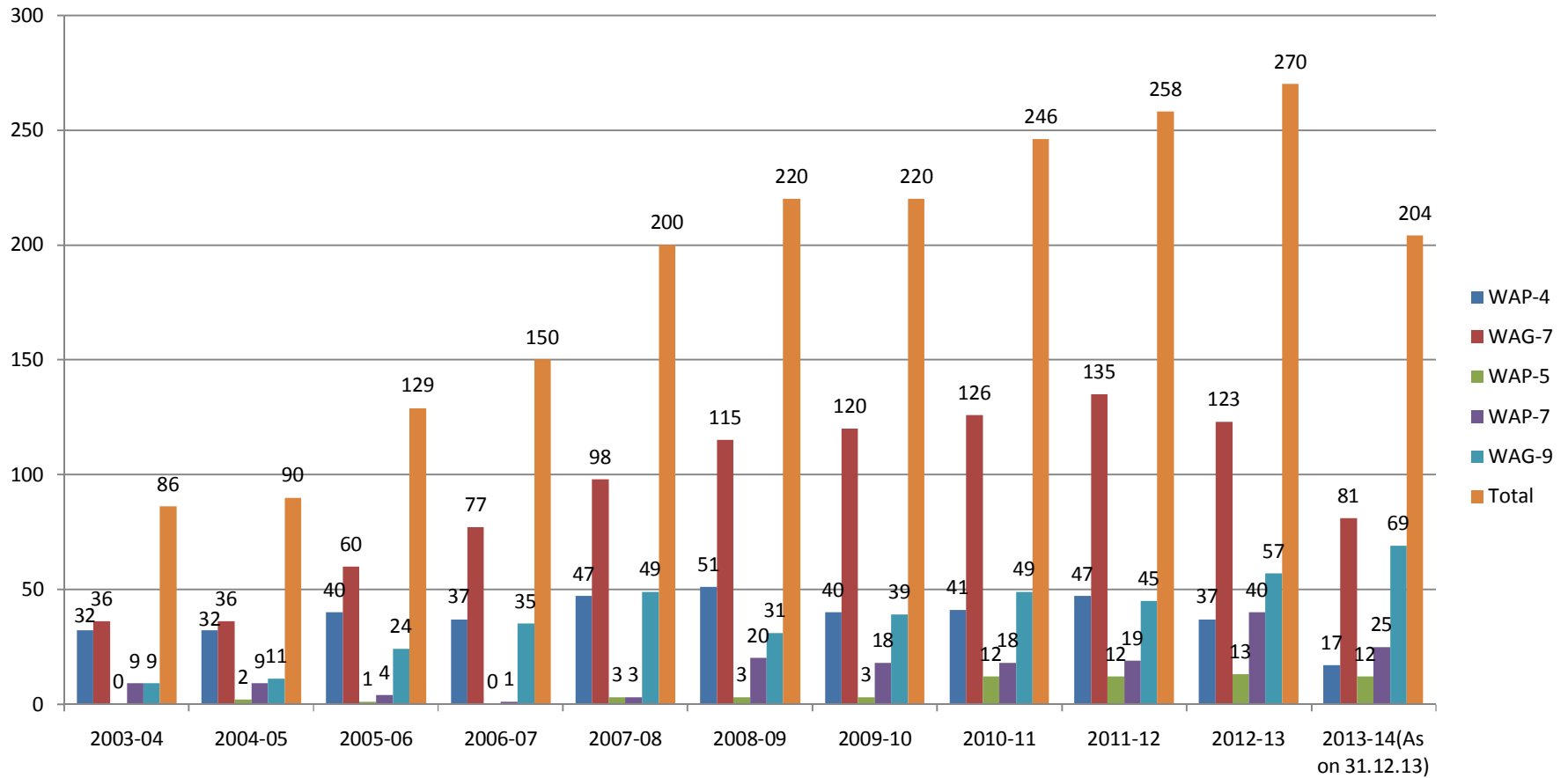
- vi. 5000 HP 6-axle freight Loco (WAG-7) with fabricated bogies (High Adhesion) and secondary suspension with axle load of 20.5 Ton suitable for air brake trailing stock
- vii. 5000 HP, 6 Axle AC Passenger Traffic Locomotives (WAP-4) fitted with Flexi-coil cast steel bogies and Axle load of 18.8 Ton hauling Rajdhani Express and other Super Fast trains.
- viii. 3-phase AC Thyristor controlled 6000 HP, 6 Axle freight WAG-9 H (with an Axle load of 22.5 Ton).
- ix. Passenger version of 3-phase loco viz. WAP-5 with an axle load of 19.5 ton having Micro processor controlled Brake system for hauling Mail/Express and other Super fast trains.
- x. Passenger version of 3-phase Loco viz. WAP-7 with an axle load of 20.5ton having Microprocessor controlled Brake system suitable for hauling Mail/Express and other super fast trains.

During the year 2012-13 CLW has manufactured 37 nos. WAP-4, 123 nos.WAG- 7, 57 nos.WAG-9, 13nos.WAP-5 and 40 nos. WAP-7 Electric Locomotives i.e. total 270nos. Locomotives against planned yearly out turn of 273 Electric Locomotives (As per JPO-59, dt. 09.01.2013). CLW has planned to produce 275 nos Electric Locomotives during the year 2013-14 & 280 nos Electric Locomotives during the year 2014-15(As per JPO-63, dt.1.2.14).

4.1.1 Year wise production from 2000-01 to 2013-14 vis-à-vis production programme as said by the Railway Board are as under:

<b>YEAR</b>		<b>WAP-4 (RAJ)</b>	<b>WAG-7 (HH)</b>	<b>WAP - 5 (TP)</b>	<b>WAP-7 (TPP)</b>	<b>WAG-9 (TG)</b>	<b>Total</b>
2000-01	Target	45	67	2	1	5	120
	Actual	50	62	2	1	5	120
2001-02	Target	37	50	-	1	2	90
	Actual	34	40	-	2	6	82
2002-03	Target	20	24	4	9	12	69
	Actual	28	27	1	6	7	69
2003-04	Target	32	39	-	9	6	86
	Actual	32	36	-	9	9	86
2004-05	Target	30	35	-	13	12	90
	Actual	32	36	2	9	11	90
2005-06	Target	39	56	4	2	27	128
	Actual	40	60	1	4	24	129
2006-07	Target	37	77	1	-	35	150
	Actual	37	77	-	1	35	150
2007-08	Target	47	98	3	3	49	200
	Actual	47	98	3	3	49	200
2008-09	Target	51	115	4	20	30	220
	Actual	51	115	3	20	31	220
2009-10	Target	40	120	5	20	45	230
	Actual	40	120	3	18	39	220
2010-11	Target	35	95	15	30	55	230
	Actual	41	126	12	18	49	246
2011-12	Target	30	100	15	30	55	230
	Actual	47	135	12	19	45	258
2012-13	Target	20	100	15	40	75	250
	Actual	37	123	13	40	57	270
2013-14 As per JPO-61, dt. 16.7.13(As on 31.12.13)	Target	20	92	15	50	98	275
	Actual	17	81	12	25	69	204

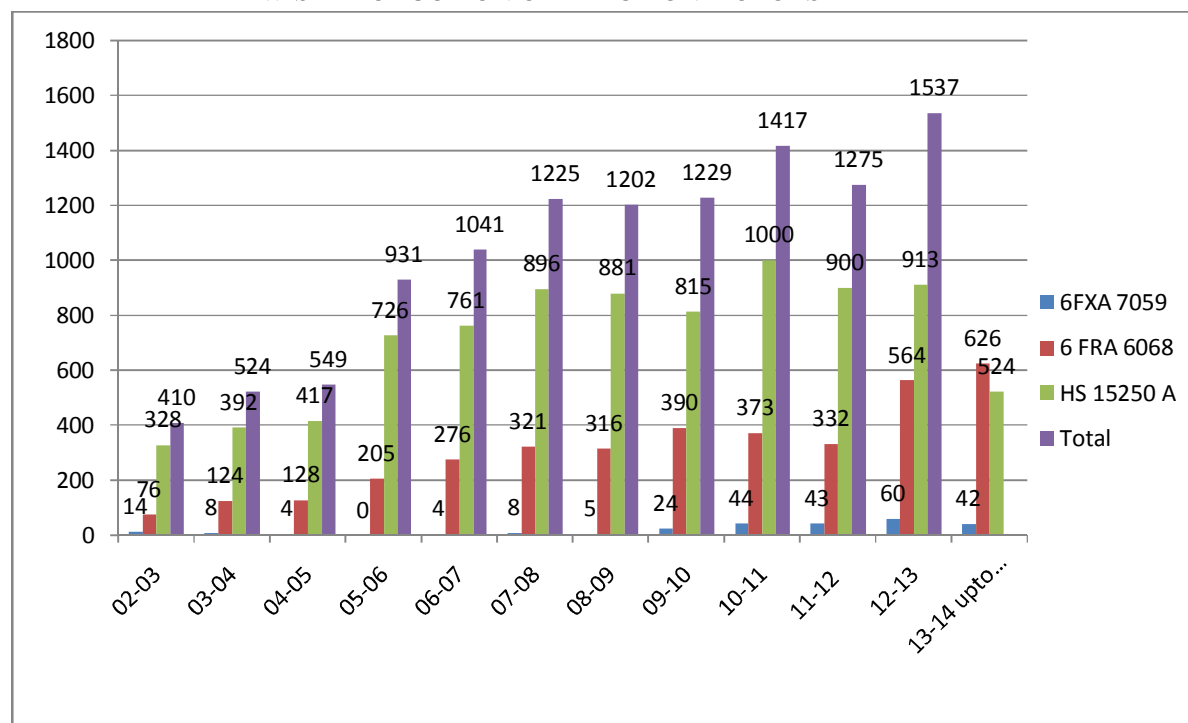
Year wise Electric Loco production from 2003-04 to 2013-14(As on 31.12.13)



## 4.2 TRACTION MOTORS:

4.4.1 Cumulative production of Traction Motors during the year 2013-14 upto 31.12.13 has been 1192 Traction Motors (524 Hitachi & 668 Three Phase). Yearwise production of Traction Motors is given at Annexure-II.

YEARWISE PRODUCTION OF TRACTION MOTORS



### 4.2.2 STATIC EQUIPMENT:

Static equipment are required for manufacture of conventional locomotives (WAG 7/ WAP4)

The production of Static Equipment during 2013-14 was 80 loco sets + Rly. Spare demands.

Details of various items of Static Equipment (Quantity in number) manufactured during the year 2013-14 up to 31.12.13 is shown below:

Item Description	Qty. (No.)	Item Description	Qty. (No.)
Motor Contactor (MC)	306	Traction Braking Switch (CTF-1,2&3)	114
Shunting Contactor (SC)	872	Master Controller (MP)	89
Electro Magnetic Contactor (EMC)	270	Smoothing Reactor (SL)	96
Braking Excitation Contactor (C145)	51	Inductive Shunt (SJ)	157
Reverser (J)	79		

Year wise production of various static equipments from 1972-73 onwards are given in Annexure III

#### 4.2.3 SUPPLY OF SPARES :

The following materials were supplied to zonal Railways as spares during the year 2012-13 up to 31.12.13 against their sanctioned RSPS/vetted indents.

Item Description	Qty. (No.)	Item Description	Qty. (No.)
Hitachi Traction Motor	108	3 Phase Traction Motor (Co Co)	16
3phase Rotor SCH-I (Co-Co)	02	Smoothing Reactor (SL)	6
3phase Rotor SCH-II(Co -Co)	11	Hitachi Armature shaft	25

#### 4.2.4 IMPROVEMENTS TO ENHANCE RELIABILITY:

To improve reliability and performance, modifications as listed below have been implemented during 2013-14 up to 31.12.13.

##### 4.2.4.1. THREE PHASE TRACTION MOTOR TYPE 6FRA 6068 :

- To arrest the failure of Bearing seizure, looseness of Inner bearing labyrinth (stopper) inside End frame (DE & NDE), the interferences between components has been revised vide RDSO Modification sheet No.RDSO/2012/EL/MS/0415(Rev.0) dated 30.10.12. All drawings of the relevant components have been modified and implemented accordingly.
- To arrest the failure of speed sensor, in-house test facility of speed sensor with installation of CRO arrangement has been implemented.
- For redundancy, specification of speed sensor has been modified incorporating completely another independent channel such that incase of any failure in one channel, other channel will remain active.
- Grease escape hole in End frame (NDE) of phase TM type 6FXA 7059 has been incorporated in drawing and referred to RDSO for approval.
- Specification of temperature sensor has been revised so as to get complete integrated unit from trade avoiding soldering defects.

##### 4.2.4.2 HITACHI TRACTION MOTOR TYPE HS-15250A :

- To reduce the amount of counter weight in balancing the Armatures, dynamic balancing of Armature stack (before winding) with commutator and correction thereafter has been started.
- To maintain the specified depth(2 to 2.5mm) of mica undercutting of commutator, the process of diamond turning before mica undercutting has been started.

##### 4.2.4.3 INNOVATIONS & DEVELOPMENTAL WORK IN T.M . SHOPS :

- During 2013-14, CLW has switched over to scheme 6 I/II rotar manufacturing from V2 design.

#### 4.5 Production Performance of Manufacturing Shops

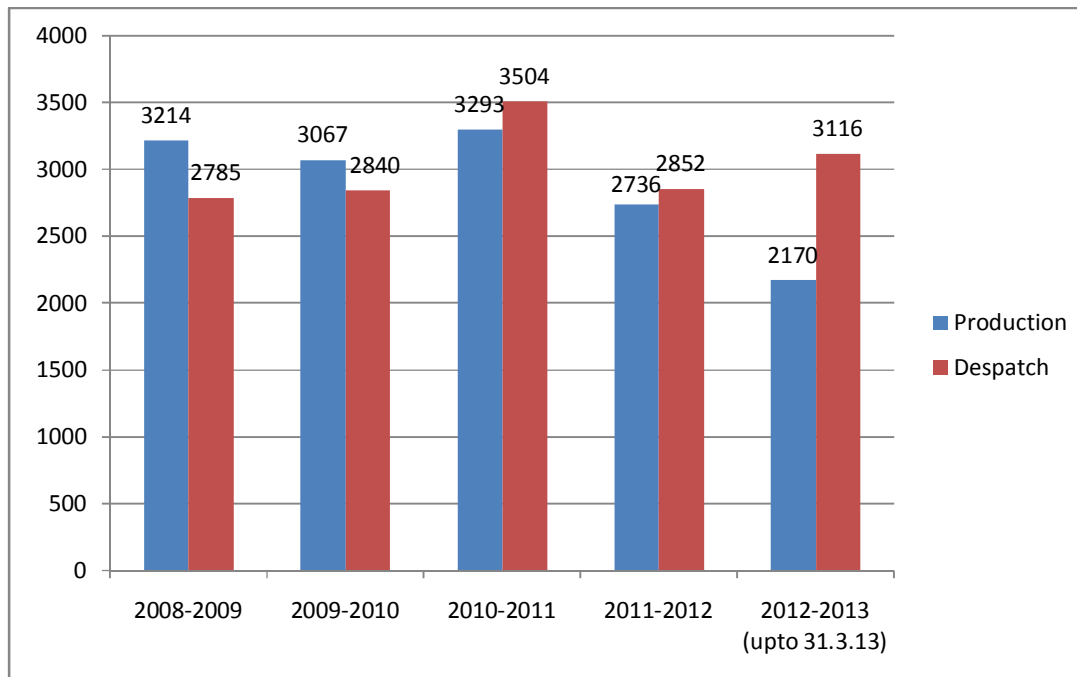
4.6

Sl No.	Name of items	2011-12	2012-13	2012-13 (up to Dec02)	2013-14 (up to Dec03)	Comparison of production of 2013-14 with 2012-13 Excess(+), Less(-)
1.	Wheel set assembly	275 L/S	291 L/S	213 L/S	202 L/S	+11 L/S(non availability of WAG-9 /WAP-7 wheel disc and main gear of WAP-5)
2.	Hitachi Susp. Tube	552Nos.	537 Nos	426 Nos	206 Nos	- 220 nos.( Conventional loco target reduced by 22 L/s and material received from Trade)
3.	Hitachi Magnet	189 Nos	190 Nos	136 Nos	123 Nos	-13nos. (Non-availability of Steel

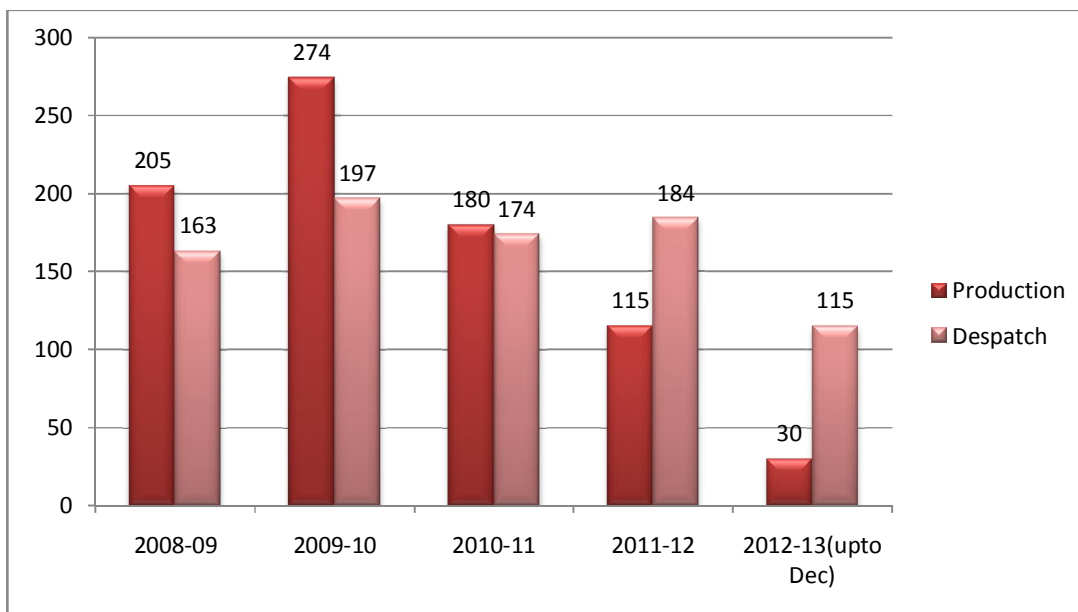
	Frame					components of Magnet Frame Kit)
4.	Stator 3 phase	394Nos.	394 Nos	288 Nos	333 Nos	+45 nos.
5.	Equaliser	139 L/S	120 L/S	93 L/S	82 L/S	-11 L/S (Conventional loco target reduced by 22 L/S))
6.	Compensating Beam	141 L/S	120 L/S	94 L/S	82 L/S	-11 L/S (Conventional loco target reduced by 22 L/S))
7.	WAG9 Head Stock	39 L/S	47 L/S	31 L/S	42 L/S	+11 L/S

#### 4.4 Production Performance of Steel Foundry :

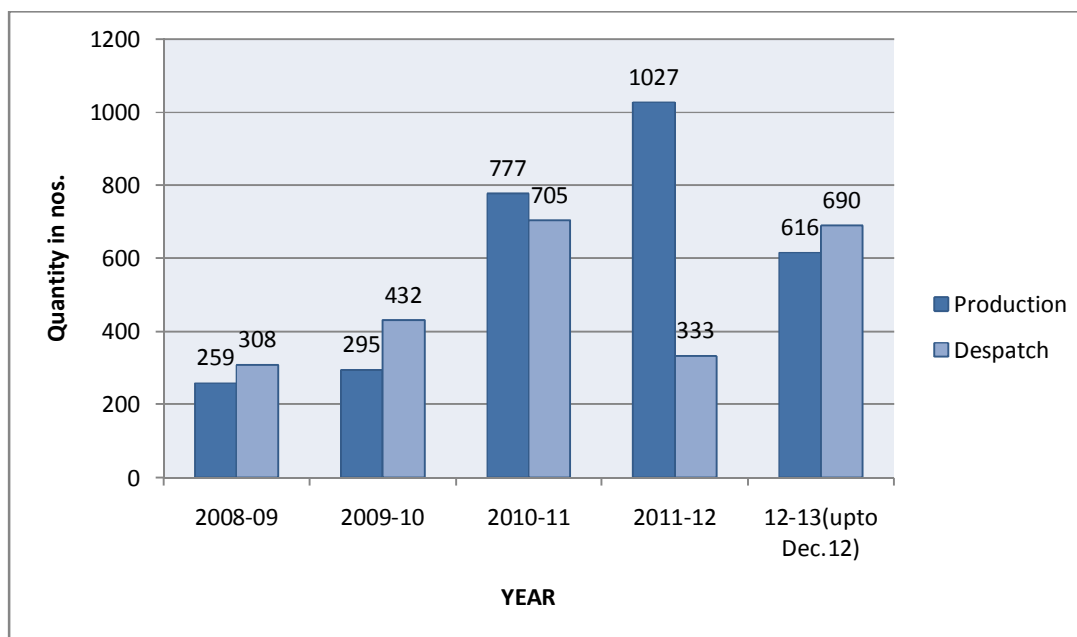
##### 4.4.1 Production and Despatch of Steel Castings over last five years—



**4.4.2 Production and Despatch of Loco Bogies over last five years**



**4.6 Production & Desp. of Casnub Bogie Castings over last five years**





## Annexure – I

## YEARLY OUTTURN OF ELECTRIC LOCOMOTIVES FROM CLW

Year	WC M-5	DC WC G-2	AC MT WA G-1 WA G-4	ACMT (WK) WAM -4B	WAG -5A	ACMT WAP -1,3,4	ACMT WCA M-4	WAG -7	DC WC M-6 WC G-3	ACMT WAM -4	WAG -9	WAP -5	WAP -7	Grand Total
1961-62	05													5
1962-63	14													14
1963-64	2		2											4
1964-65			27											27
1965-66			32											32
1966-67			57											57
1967-68			50											50
1968-69			28											28
1969-70			31											31
1970-71		3	41							06				50
1971-72		6								40				46
1972-73		14								41				55
1973-74		14								36				50
1974-75		13					1			32				46
1975-76		4					4			46				54
1976-77		3					13			28				44
1977-78							18			41				59
1978-79				5			11			40				56
1979-80				2			6			43				51
1980-81				11		4				54				69
1981-82				17						33				50
1982-83				2						51				53
1983-84				17	21					9				47
1984-85					49	1								50
1985-86					54									54
1986-87					70	1								71
1987-88					65	1								66
1988-89					98	2								100
1989-90					100	5								105
1990-91					102	8								110
1991-92					104	10		1						115
1992-93					108	12		5						125
1993-94					105	15		20						140
1994-95					105	15		30						150
1995-96					61	14		59	1					135
1996-97					25	18		111	1					155
1997-98						28		137						165
1998-99						45		112			8			165
1999-00						60		50			8	1	1	120
2000-01						50		62			5	2	1	120

2001-02						34		40			6	-	2	82
2002-03						28		27			7	1	6	69
2003-04						32		36			9	-	9	86
2004-05						32		36			11	2	9	90
2005-06						40		60			24	1	4	129
2006-07						37		77			35	-	1	150
2007-08						42		98			49	3	3	200
2008-09						51		115			31	3	20	220
2009-10						40		120			39	3	18	220
2010-11						40		120			40	12	18	230
2011-12						47		135			45	12	19	258
2012-13						37		123			57	13	40	270
2013-14 (upto 31.12.13)						17		81			69	12	25	204
<b>TOTAL</b>	<b>21</b>	<b>57</b>	<b>268</b>	<b>54</b>	<b>1067</b>	<b>771</b>	<b>53</b>	<b>1655</b>	<b>02</b>	<b>500</b>	<b>443</b>	<b>65</b>	<b>176</b>	<b>5132</b>
<b>Summary as on 31.12.13</b>						<b>Steam locos – 2351 nos.</b> <b>Diesel locos – 842 nos.</b> <b>Electric locos – 5132 nos.</b> <b>Total - 8325nos.</b>								

**Annexure - II**

**ANNUAL PRODUCTION OF TRACTION MOTORS AT CLW**

Year	MG-1580	TAO-659	HS15250A	6FRA6068	6FXA7059	TOTAL
1969-70	92	-	-	-	-	92
1970-71	92	-	-	-	-	92
1971-72	18	129	-	-	-	147
1972-73	-	75	-	-	-	75
1973-74	-	195	-	-	-	195
1974-75	-	255	-	-	-	255
1975-76	4	349	-	-	-	353
1976-77	12	233	-	-	-	245
1977-78	12	425	-	-	-	437
1978-79	8	425	-	-	-	433
1979-80	8	385	-	-	-	393
1980-81	10	432	-	-	-	442
1981-82	5	430	-	-	-	435
1982-83	8	420	-	-	-	428
1983-84	4	361	-	-	-	365
1984-85	1	305	-	-	-	306
1985-86	3	325	-	-	-	328
1986-87	12	440	-	-	-	452
1987-88	6	380	-	-	-	386
1988-89	8	350	79	-	-	437
1989-90	14	350	-	-	-	364
1990-91	9	450	21	-	-	480
1991-92	5	500	80	-	-	585
1992-93	6	500	95	-	-	601
1993-94	2	400	250	-	-	652
1994-95	-	220	422	-	-	642
1995-96	-	92	630	-	-	722
1996-97	-	36	701	-	-	737
1997-98	-	4	750	-	-	754
1998-99	-	-	755	6	-	761
1999-00	-	-	600	6	4	610
2000-01	-	-	528	30	-	558
2001-02	-	-	400	36	4	440
2002-03	-	-	320	76	14	410
2003-04	-	-	392	124	8	524
2004-05	-	-	417	128	4	549
2005-06	-	-	726	205	-	931
2006-07	-	-	761	276	4	1041
2007-08	-	-	896	321	8	1225
2008-09	-	-	881	316	5	1202
2009-10	-	-	815	390	24	1229
2010-11	-	-	1000	373	44	1417
2011-12	-	-	900	332	43	1275
2012-13	-	-	913	564	60	1537
2013-14 (upto 31. 12. 13)	-	-	524	626	42	1192
<b>Total</b>	<b>339</b>	<b>8466</b>	<b>13856</b>	<b>3809</b>	<b>264</b>	<b>26734</b>

## Annexure - III

## ANNUAL PRODUCTION OF STATIC EQUIPMENTS AT CLW

YEAR	Motor Contactor (MC)	Shunting Contactor (SC)	Electric Magnetic Contactor (EMC)	Breaking Excitation Contactor (C145)	Reverser (J)	Traction Breaking Switch (CTF1,2 & 3)	Master Controller (MP)	Inductive Shunt (SJ)	Smoothing Reactor (SL)
1972-73	125	864	592	--	123	--	121	129	46
1973-74	185	754	495	--	102	--	94	171	73
1974-75	135	624	449	--	120	--	104	103	49
1975-76	257	812	576	--	104	--	123	147	70
1976-77	243	816	560	005	101	015	118	183	64
1977-78	348	637	664	023	113	031	147	234	74
1978-79	349	692	628	023	100	019	134	210	75
1979-80	330	838	667	009	092	022	126	231	66
1980-81	412	843	729	001	112	041	146	219	52
1981-82	514	784	709	065	126	124	157	209	90
1982-83	630	885	606	049	118	154	149	175	92
1983-84	776	548	696	112	100	165	140	066	100
1984-85	646	268	740	136	129	191	133	050	80
1985-86	686	480	860	076	125	213	155	039	104
1986-87	598	608	960	062	137	213	167	019	140
1987-88	604	416	1016	075	154	220	168	012	170
1988-89	602	616	830	101	336	167	203	150	210
1989-90	662	1200	920	110	238	282	230	215	220
1990-91	700	1800	960	120	240	345	240	310	240
1991-92	740	2360	1075	105	250	360	250	340	242
1992-93	750	2400	1124	100	295	405	290	390	250
1993-94	906	2718	1216	133	337	409	300	400	280
1994-95	972	2945	1162	157	324	450	320	480	300
1995-96	948	2630	1057	138	316	384	300	404	254
1996-97	868	2752	976	130	276	378	292	450	308
1997-98	980	2268	1105	157	339	439	342	495	340
1998-99	982	3577	983	128	350	453	343	500	321
1999-00	853	2672	932	139	291	339	285	390	260
2000-01	728	2469	952	129	328	408	237	268	224
2001-02	698	1565	549	122	277	390	200	280	210
2002-03	490	1244	740	80	158	340	165	154	164
2003-04	580	1796	1089	171	249	246	200	212	151
2004-05	534	1770	696	141	183	286	178	213	124
2005-06	708	2430	1066	181	256	450	232	322	206
2006-07	810	2500	965	200	268	446	270	375	239
2007-08	1020	2800	1020	222	324	416	275	457	304
2008-09	933	2588	1044	158	272	482	338	362	196
2009-10	480	1560	520	80	160	240	160	232	149
2010-11	480	1560	520	80	160	240	180	271	124
2011-12	480	1560	430	80	156	210	180	259	145
2012-13	480	1560	430	80	140	210	210	231	139
2013-14 (up to 31.12.13)	306	872	270	51	79	114	89	157	96
Total	25528	65081	33578	3929	8458	10297	8491	10514	7041

5

DESIGN & DEVELOPMENT  
INCLUDING TOT

## 5. CENTRE FOR DESIGN & DEVELOPMENT:

### 5.2 Setting of Centre of Excellence at CLW for Design and Development of New Technology Equipment for Electric Rolling Stock

The purpose of establishing the Centre of Excellence is to develop capability for designing, development and evaluation of advanced technology systems for Electric Rolling Stock. Consultancy work has been awarded to M/s E.C. Engineering/Poland

#### **Status:-**

All specifications have been approved by Rly. Brd. NSR for item nos. 1, 2, 3, 4 and 5 under finance vetting since 16.10.2012. Finance vetting is still awaited.

### 5.3 Development of IGBT Technology based Power Converter for 3-phase Locomotives

The present Power Converter is based on GTO technology which is slowly getting outdated by improved IGBT technology. So far, a total order of 138 L/sets of IGBT based power converters have been placed on different firms (M/s. BHEL . 57 L/sets, CGL . 03 L/sets, BTIL . 15 L/sets & ABB . 63 L/set).

#### **Status:-**

**BTIL:** First loco with IGBT based Traction Converter commissioned in loco 31234 and turned out from CLW on 18.12.09. Homed at ELS/GMO in DHN division. Presently 14 locomotives with BTIL supplied IGBT based traction converters are running.

**BHEL:** First loco with IGBT based Traction Converter commissioned in loco 31248 and turned out from CLW on 04.10.10 homed at ELS/LGD in SC division.

Presently 24 locomotives with BHEL supplied IGBT based traction converters are running.

**CGL:** One set commissioned in loco No. 31412 and dispatched in Sept 03. Slip Slide test of locomotive is in progress at ELS/GMO. Supply of remaining sets to commence after the trial run of the prototype set.

**ABB:** First loco with IGBT based Traction Converter commissioned in loco 31281 and turned out from CLW on 31.01.11 homed at ELS/AQ in NGP division. Presently 19 locomotives with ABB supplied IGBT based traction converters are running.

### 5.4 Development of IGBT Technology based Auxiliary Converter for 3-phase Locomotives

The Auxiliary Converter presently being used are also GTO technology based which is getting obsolete. In order to adopt the latest IGBT technology, this project has been undertaken. So far, a total order of 132 L/sets of IGBT based Auxiliary converters have been placed on different firms (M/s. BHEL . 46 L/sets, CGL . 41 L/sets, BTIL . 15 L/sets HIRECT -10 & ABB . 20 L/set).

#### **Status:-**

**BHEL:** First loco with IGBT based Auxiliary Converter commissioned in loco 31248 and turned out from CLW on 04.10.10 homed at ELS/LGD in SC division. Presently 24 locomotives with BHEL supplied IGBT based Auxiliary converters are running.

**AAL:** Loco No. 31415 (WAG-9H) dispatched to ELS/TKD on 01.08.2013. Performance under watch. Supply of remaining sets to commence after the trial run of the prototype set.

**HIRECT:** Prototype unit received at CLW. Firm to commission in locomotive.

**CGL:** Installed in Loco No. 30325. Loco dispatched to ELS/LGD in SC division on 29.10.2012. Presently 13 locomotives with CGL supplied IGBT based Auxiliary converters are running.

**ABB:** Converter commissioned in loco 31351 (WAG-9H) & was turned out from CLW on 31.08.12. Presently 08 locomotives with ABB supplied IGBT based Auxiliary converters are running.

### 5.4 Development of Open Platform Control System for Vehicle Control with TCN compatibility

#### c. Hardware:

The control system used in three-phase loco is MICAS-S2, which is proprietary of BT. CLW has taken up a project to develop control system hardware and software based on published IEC standards viz. IEC-61375 TCN. Tender Case No. 70/2004/1109 has been opened and P.O. placed on M/s. BHEL for 3 sets & M/s. Stesalit for 02 sets.

**Status:-**

**BHEL:** 1st loco set commissioned in Loco No. 31295 (WAG-9) LGD since Oct. 2011. The loco is running under ELS LGD since Oct. 2011. Remaining 02 sets commissioned on loco Nos. 31367 & 31399.

**Stesalit:** Material received at CLW on 07.11.2013. Firm to submit technical details about development of application software.

**d. Software:**

Authoring of Vehicle Control Software for TCN/IEC-61375 Compliant Hardware for 3-Phase Locomotives awarded on M/s. ARC, Bangalore.

**Status:**

Software in 1st loco set downloaded in Loco No. 31295. The loco is running under ELS/LGD since Oct. 2011. Remaining 02 sets commissioned on loco Nos. 31367 & 31399.

**5.5. Indigenous development of TCN compliant vehicle control system through C-DAC.**

This project has been undertaken through C-DAC for development of TCN compatible vehicle control system which will ensure compatibility between open standard equipments of different makes. MoU is for developing 02 sets of TCN compliant vehicle control system.

**Status:**

Commissioning has been completed in loco No. 31356 (WAG-9H). Loco dispatched to ELS/TKD. Performance under watch.

C-DAC has requested for additional funds for the project vide letter dated 29.10.2012.

Revised estimate prepared and under finance concurrence.

A meeting was held at C-DAC/TVC on 06th & 7th Jan 2014 to discuss modalities for transfer of ToT from C-DAC to prospective suppliers.

**5.6. Development of modular and Universal Aux. Converter for Locos & EMUs with C-DAC**

This project shall result in development of a modular universal auxiliary converter for railway rolling stock so that the same electrics can be used in 3-phase loco, tap changer loco and EMUs. C-DAC/TVC is executing the project. MoU is for developing 07 prototypes of 130 kVA of modular and Universal Aux. Converter for Locos & EMUs.

**Status:**

Prototype has been received at CLW. Full load test completed in loco no. 31356 (WAG-9H). Test results evaluated by C-DAC. Box2 to be supplied to CLW.

C-DAC has requested for additional funds for the project vide letter dated: 25.10.2013.

Revised estimate prepared and under finance concurrence.

**5.7. Development of Wireless remote control for control of slave locomotives on a train.**

This project has been taken up as per RSP provision. The project shall help develop wireless communication amongst locomotives in a train formation leading to better adhesion and other operational advantages. 2 sets of this system have been ordered on M/s ARC Bangalore for 3-phase locomotives.

**Status:**

The prototype has been installed in loco nos. 31282 (WAG-9) & 31284 (WAG-9). Loco has been put into commercial service w.e.f. 18.05.2012.

2<sup>nd</sup> set received on 18.12.13. Loco to be nominated.

**Case for 75 locosets:** Tender opened on 29.05.2013. Case under TC.

**5.8. Development of wireless MU coupler system for AC tap changer locos.**

**Status:**

PO issued for 01 set each on M/s Medha and M/s Lotus Wireless

**M/s Lotus Wireless:** The equipment has been commissioned in July, 2012 in loco No. 28480 (WAG-7) & 28481 (WAG-7) and dispatched to ELS/KZJ.

**M/s Medha:** Provisional design clearance given by RDSO in Jan 2012. Brake interface under evaluation at RDSO.

**5.9. Development of Active Speed sensor with Doppler radar on 3-phase locos.**

This project is for improving slip slide control of 3-phase locomotive of Zonal Railways and appears in RSP. An order of 80 locosets placed on M/s ARC/Bangalore. Firm requested for extension of qty by further 62 sets.

**Status:**

All 80 sets have been installed in different sheds. (GMO-30, AQ-30 & LGD-20).

**5.10. Development of Hotel load Converter**

This is for utilizing OHE power for supply of hotel load of coaches through HOG Scheme by providing Hotel Load converter in the locomotive. Order placed on M/s AAL - 03 sets, Siemens - 03 set, BHEL . 04 set ABB-4 set and Medha- (01+07) sets.

**Status:**

**Siemens:** Hotel load converter fitted in 30277 (WAP-7) and dispatched to GZB on 30.06.2010. Commercial service of the loco started on 21.02.2011.

2<sup>nd</sup> set installed in loco No. 30365 (WAP-7) dispatched to ELS/GZB on 31.10.2013.

**BHEL :** Firm has not given time schedule for type test. RDSO is following the matter further.

**AAL:** Firm has revised dimensions of hotel load converter box. The same has been checked in the locomotive in presence of RDSO on 19.10.2013. RDSO has been advised to give necessary design clearance.

**ABB:** Prototype inspection to be held from 4<sup>th</sup> February 2014.

**MEDHA:** Loco No. 30375 (WAP-7) dispatched to ELS/GZB.

**5.11. Development of Alternate Drive Gear Assembly for WAP5 AC Electric Locos (160 Kmph).**

This project will address the reliability issues of the presently used hurth coupling by way of improved design of the transmission system. Procurement of 5 loco sets (20 Nos.) of new type of Drive Gear system as per RDSO specification.

**Status:**

- One locoset commissioned in Loco No. 30056 (WAP-5). Loco sent to ELS/Vadodara.
- RDSO to issue field trial clearance.

**5.12. Development of Alternate Drive Gear Assembly for WAP5 AC Electric Locos (200 Kmph).**

This project will address the reliability issues of the presently used hurth coupling by way of improved design of the transmission system. Procurement of 2 loco sets (08 Nos.) of new type of Drive Gear system as per RDSO specification.

**Status:**

Provisional I/C issued. Material expected in Feb 14. Installation to start after receipt of material.

**5.13. New Driver Display (100 nos.)**

The project has following rationale:

- 10.4+VGA Graphical Colour Display (TFT)



- Provides a number of graphic screens for process data visualization
- Trouble Shooting Directory.
- Aesthetically beautiful appearance.

**Status:**

**ARC:** All units have been installed by July 12. Performance from Rlys. has been collected and it has been made a regular item.

**Jayashree Engg. Works:** Test for communication performed by the firm at C-D&D in April 12. Firm has submitted internal test report on 31.10.13.

D.P. has expired. Firm to submit valid D.P. extension.

**N & S Solutions:** Test protocol of the firm has been approved on 25.12.2013. Firm has been asked to submit internal test reports and offer for prototype tests.

#### 5.14. Composite converter

Indian Railways has planned to migrate to IGBT based technology for its 3-phase WAP5 locomotives. Implementation of HoG scheme in WAP-5 loco is an issue because of the smaller size of the locomotive. Considering smaller size of the IGBT based traction converter vis-à-vis GTO based, IR has planned to implement the composite converter housing both traction and hotel load converter in the same cubicle in WAP-5 locomotives.

**Status:**

Tender opened on 09.11.2012. Case discharged. The revised specification under preparation in consultation with manufacturers and RDSO.

#### 5.15. Indigenous development of propulsion system

IGBT based 3-phase propulsion system consists of traction converter, auxiliary converter, and control electronics (Vehicle control unit).

An order of 15 loco sets placed on BHEL. Quantity was to be enhanced by 15 sets by operating special option clause as per Rly. Board's Contract. Railway Board has not agreed to enhance quantity by 15 sets.

An order of 05 loco sets placed on MEDHA.

**Status:**

**BHEL:** 1st loco set on Loco no. 31347 (WAG-9) dispatched to ELS/LGD on 11.7.2012.

14 more locomotives have been commissioned.

**MEDHA:** Loco No. 31427 (WAP-7) dispatched to ELS/LGD on 31.10.2013. Balance supply after clearance of field trial by RDSO.

### INNOVATIONS & DEVELOPMENTAL WORK :

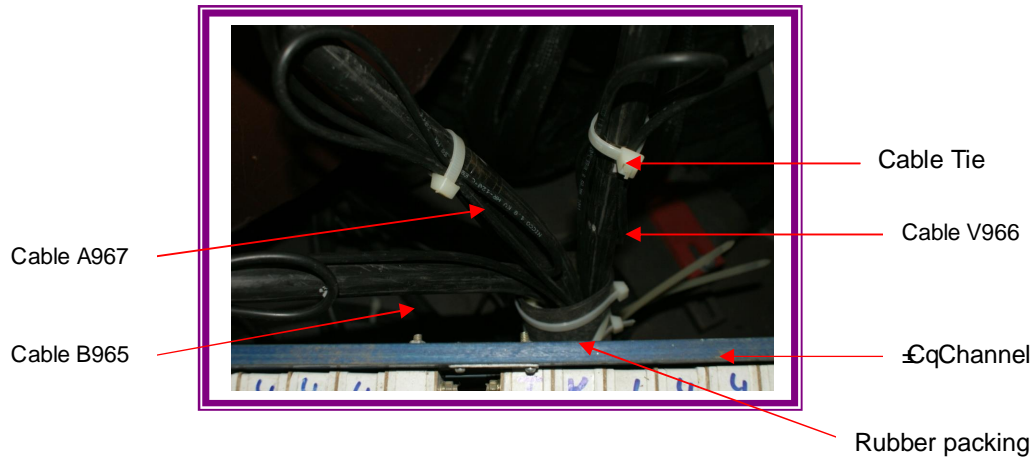
#### 5.16 INNOVATIONS & DEVELOPMENTS

##### *Innovations*

- **MU Operation of loco fitted with Microprocessor based control and fault diagnostic System :** Multiple unit operation of locos fitted with Microprocessor based control and fault Diagnostic System has been successfully completed at CLW on regular basis from March- 2012. Necessary circuit modification has been carried out and RDSO has been advised. Trial has been done with same make and different makes of FDSCS. This will facilitate smooth MU operation of these locos in Zonal Railways.



- **Modification in cable bunching of SIV cable:** Three output cables of SIV has been padded with rubber packing and secured with cable ties to avoid rubbing with  $\varnothing$ channel.



**Revised pipeline layout for WAP4 loco :** To avoid external hitting of under frame pipe lay out, the same has been shifted from underframe to machine compartment in L side wall with socket arrangements and double ferrule pipe fittings like 3-phase loco, No. 22901 & 22903. Regular cut-in will be made after getting regular supply of brass pipe fittings.



- **RDSO modification implemented IN(i)** No. RDSO/2012/EL/MS/0407 - Standardization of power selection switch position in Flasher unit in 3-phase loco. Implemented from loco No. 31341 and onwards.
  - (ii) No. 390 ó Paralleling of interlock ó Implemented from loco No. 31324, 30308 & 30047 onwards.
  - (iii) No. RDSO/2011/EL/MS/0404 ó Isolation of hard/soft QD during operation of HMCS SWITCH ó Implemented from loco No. 28443 onwards.
- Successful trial has been carried out under NR for operation of WAP-5 in multiple consists. Software modification for the same has been successfully completed at C-D&D/CLW. This will enable running of slave loco, without raising its pantograph, drawing OHE power from master locomotive through the HV cable. This will achieve running of Rajdhani/Shatabdi with 24 coaches at high speed using locos in multiple consists.
- A software modification has been carried out to improve the monitoring of Auxiliary Converter by Vehicle Control Unit (VCU). The software patch has been sent to different Railways for testing in 05 (five) locomotives each before the routine cut-in. This software modification will be helpful in preventing the isolation of Auxiliary Converter during the operation of locomotive.
- A new Induction Heating Puller developed for extraction of inner racer from Hitachi Armatures and 3-phase Rotors.
- 60 nos. Scheme-I type 3-phase Rotor for WAG-9 manufactured at CLW as per RDSO guideline out of which, 38 nos. already sent for field trial, rest are under motor assembly.
- One no. Hitachi Armature developed and manufactured by Traction Motor Shop with 3-phase Insulation Scheme to upgrade insulation class from 200°C to 250°C. This armature assembled in Motor No.11786 and fitted in Loco No.28374, such insulation scheme shall be switched over if performance is improved.

**5.17** Following design and development projects have been implemented in Electric Locomotives under manufacturing at CLW .

- Underslung Compressor : To increase the air capacity and create to the space inside the engine room, 1750 LPM underslung Compressor is provided in Loco No.22926,22975,22976
- WAP-5 Loco provided with MU Coupler : to enable hauling of 24 coaches train upto 160 kmph multiple unit (MU) operation has been provided in WAP-5 locomotives. Loco no. 30069 and 30070 in multiple consist are provided with this system.
- EP assist Brake : For quick release and application of brake in trail lock EP assist brake is provided in WAP-4 Loco no. 22967 & 22968.
- CCB in WAP-5 Loco : Computerized Control Brake system is introduced in passenger version of locomotives in Loco no.30072.
- Modified LSDBR Circuit : to avoid wrong indication of working of AC MVRF in MPCS fitted loco signaling light LSDBR circuit modified and introduced from loco no. 28627 onwards.
- Marker Light Circuit Modified: Marker light circuit modification implemented on regular basis.
- DU type Relay: In place of PC-8 type Relay DU type (QSIT) is introduced for flap type indication to the driver in aux. static converter circuit in conventional WAG-7 locomotive from loco no. 28632 to 28636.
- IGBT based Locomotives : Latest IGBT technology based power converter and aux converter have been introduced in place of existing GTO based converter in CLW make locomotives. 44 nos. locomotives have been dispatched with IGBT converter up to 31<sup>st</sup> December 2013.
- Indigenous IGBT Propulsion system : Indigenous IGBT based propulsion system comprising traction converter, aux converter & VCU developed by M/s Medha has been successfully commissioned in loco no. 31427 . Loco is presently in field trial under SCR.

6

# QUALITY ASSURANCE

## 6.QUALITY ASSURANCE

### 6.3 Quality Objective & Targets:

6.4 Inspection of locomotives and its components in the inspection shop to be done .100% strictly on the basis of work instruction and their related Design , Drawings, Specifications and Standard to meet Quality requirement on continuing basis.

### 6.3 Other Objectives:

6.3.1 Constant Endeavour for quality improvement of the products at all stages of manufacturing which are turned out from different shops of CLW.

6.3.2 To carry out inspections of various assembly and sub-assembly being manufactured in Traction Motor shops, Static Equipments Shops, Heavy m/c shop, light m/c shop, Loco fabrication shops and Steel Foundry shops as well as assembly and dispatch of locos.

6.4.14 To certify the Material Movement Slip for movement of products conforming to the drawing/WI/ Specification from one shop to other and consequently clearing job Cards related to that product.

6.4.15 To prepare Loco inspection Certificates and sent them to user Railways. The Inspection data on Standard Formats used to make the said Loco IC are now scanned instead of feeding the same to make it flaw less soft copy of the document.

### 6.5 Achievements:

6.4.1 DPT test for all round welding joints of Three Phase Axle Guide Bearing Post has been introduced from January 2013.

6.4.2 U/T test introduced (from December 2012) for checking the defects of covering plate welding joints with traction pillar in central under frame in 3 phase loco.

6.5.3 Existing inspection format of long beam assembly of WAG-7 loco has been separated for checking its components i.e. end boxes and middle box individually to avoid side deflection, twists and hogging.

6.5.4 100% marking operation included in Hitachi suspension tubes.

6.5.5 10% radiography test incorporated in Hitachi suspension tubes in order to prevent casting defects.

6.5.6 100% marking operation introduced in Rotor clamp to avoid shortage/ excess material in the casting.

6.5.7 10% radiography test incorporated in TM items i.e Commutator Spider and Rotor Clamp to avoid shortage/excess material in the casting.

6.5.8 New check list has been introduced for checking the ventilation ducts in WAP-5 loco w.r.t longitudinal and center line of loco.

6.5.9 Copper strip in BA panel being insulated by taping to avoid flashover.

6.5.10 MCP cables at oil tray being protected by means of additional wrapping of rubber sheets.

6.5.11 100% Radiography introduced in Centre Pivot Pin to prevent casting . Fabrication shop advised to follow the TOT Welding Procedure Specification for welding of Centre PIVOT Pin.

6.5.12 Alternate route for laying of FDCS Cables implemented to avoid rubbing/pressing of cables on BD Panel top.

6.5.13 Profile checking of CBC introduced to ensure proper engagement of CBC.

### 6.5 METALLURGICAL & CHEMICAL LABORATORY

Metallurgical & chemical Laboratory headed by Deputy Chief chemist & Metallurgist , and assisted by associated officer of Chemical and Metallurgical wing is responsible for quality assurance of Electric Loco components by conducting metallurgical , chemical and non-destructive test of casting , forging & fabricated components as well as physical-chemical test of non-metals , rubber items , paints & oil lubricants . It consists of three units i.e main Lab., NDT Lab, loco works and Steel Foundry.

The M & C Laboratory ensures quality control of inputs and finished products of Steel Foundry including stage wise process control. The M&C wing of Steel Foundry developed CBC coupler & its component as per

RDSO Specn. 56BD07 for Electric Locomotives, Wagon Coupler as per RDSO Specn.48BD08 & also E-type coupler for EMD Locomotives of DLW.

Quality control of castings like CO ó CO Bogie, FC bogie, Bolster, Casnub bogie, Suspension tube high tensile CBC Coupler etc. being closely monitored by M&C department for heat treatment cycle & their mechanical & metallurgical properties. It also ensures quality control of different raw material of Steel Foundry like Ferro ó manganese, Silico ó Manganese, Ferro-silicon, Ferro- molly, iron ore, silica sand, core binders, bentonite power etc. It also ensures quality control of furnace consumables like basic lining bricks, high alumina bricks, ladle bricks etc.

M&C Lab of SF consists of Central Lab, NDT Lab, Field Furnace Lab etc.

NDT Lab./SF arranges radiography as per RDSO Specn of various heavy critical steel casting to ensure casting quality as per specification.

Main activities of M&C organization is as under:-

- xi) CLW Steel Foundry now as a Class ó A foundry as per IS 12117 : 1996 & approved by RDSO/LKO.
- xii) Steel Foundry indigenously developed high tensile CBC Coupler for Electric locomotives as per RDSO Specn. 56BD07 , Wagon Coupler as per RDSO Spec. 48BD08 & approved by RDSO/LKO.
- xiii) CLW Steel Foundry also recently developed E-type Coupler for EMD Locomotive for DLW.
- xiv) CLW Steel Foundry got a developmental order (40 nos.) for óH-typeölight lock coupler for DLW.
- xv) CLW Steel Foundry started training to welders (48 nos.), oxy-cutter(35 nos.) & fettler(105 nos.) from Govt. Training Institute, ATI, Das Nagar/Howrah for betterment of fabrication as well as heavy casting for finishing quality work.
- xvi) CLW Steel Foundry is also sending JE/SSE (60 nos.) for total personality development training programme at Ludhiana for quality improvement & enchasement of latest modern foundry technology practices.
- xvii) Internal & external ISO: 9002 & ISO: 14000 audits as per ISO requirement & timely calibration of testing equipment.
- xviii) Testing of Loco items as per loco production target to meet the requirement.
- xix) Testing of water samples and controlling various parameters of drinking water requirements.
- xx) Review of specification from time to time for quality improvement.

Metallurgical & Chemical Lab conducts metallurgical investigations of in-service failures of components of CLW build locomotives. It maintains liaison with RDSO , BIS & other Non-Railway institutions on M&C matters.

The laboratory is being further upgraded by procuring state of the art UTM of 100 online test reporting system.

M&C Department is also in a project stage of computerization , upgradation of online test reporting system.

## 6.5.1 PERFORMANCE w.e.f. 01-01-2013 to 31.12.2013

### 6.5.1.1 METALLURGICAL & CHEMICAL LAB/LOCO: (.1.1.13 to 31.12.13 )

Sl. No.	Name of Lab.	No. of Sample Tested			Nos. of Tests			No. of Sample Accepted			% of Rejection		
		2011	2012	2013	2011	2012	2013	2011	2012	2013	2011	2012	2013
1.	Metallurgical/ Mechanical Lab.	1530	2667	3135	2918	6983	6637	1407	2580	3040	8.03	3.26	3.15
2.	Chemical Lab.	2508	3559	3421	14673	20504	19489	2446	3509	3392	2.47	1.4	0.93
3.	Filter House Lab.	1960	1993	2014	15241	16670	16895	1960	1993	2014	Nil	Nil	Nil
4.	Rubber , DMC, I. M. &	169	311	257	274	456	354	162	271	235	4.14	12.86	8.56

	Lubricant												
	<b>TOTAL</b> →	<b>6167</b>	<b>8530</b>	<b>8827</b>	<b>33106</b>	<b>44613</b>	<b>43376</b>	<b>5975</b>	<b>8353</b>	<b>8681</b>	-	-	-

#### 6.5.1.2 NDT LABORATORY (LOCO):

Sl. No.	Name of Lab.	No. of Sample Tested			Nos. of Location/ Component Tested			Nos. of Component accepted			% of Rejection		
		2011	2012	2013	2011	2012	2013	2011	2012	2013	2011	2012	2013
1.	Ultrasonic Testing	5594	6991	9786	17380	22253	27744	5519	6939	9513	0.37	0.74	2.78
2.	M P T	7135	5975	5517	21020	18480	15315	7135	5975	5510	0.28	Nil	0.12
3.	Radiographic Test	360	251	166	360	251	166	360	251	Nil	Nil	Nil	-
4.	Misc.	370	374	1709	968	937	3114	370	374	1696	Nil	2.94	0.76
	<b>TOTAL</b> →	<b>13459</b>	<b>13591</b>	<b>17178</b>	<b>39728</b>	<b>41921</b>	<b>46339</b>	<b>13384</b>	<b>13539</b>	<b>16719</b>	-	-	-

#### 6.5.1.3 METALLURGICAL & CHEMICAL LABORATORY /STEEL FOUNDRY:

#### 6.5.1.4 CHEMICAL LABORATORIES:

Sl. No.	Name of Lab.	No. of Sample Tested			Nos. of Tests		
		2011	2012	2013	2011	2012	2013
1.	Chemical Lab.	3520	3118	2773	18336	17498	16770
2.	Chemical Misc.	166	62	135	1138	361	949
	<b>TOTAL</b>	<b>3686</b>	<b>3180</b>	<b>2908</b>	<b>19474</b>	<b>17859</b>	<b>17719</b>

#### 6.5.1.5 FIELD LABORATORY/S. F. :

Sample Test					Physical & Radiographic Tests			
Sl. No.	Name of Test	No. of Tests			Name of Test	No. of Tests		
		2011	2012	1.1.13 To 31.12.13		2011	2012	1.1.13 To 31.12.13
1.	Zircon Wash	44	30	39	Tensile Strength	1436	1484	1250
2.	Green Sand	5799	6644	5689	Microstructure	426	395	505
3.	Permeability	994	1093	983	Charpy	0	-	0
4.	No-bake Sand	554	1048	958	Hardness	135	142	985
5.	Silica Sand	74	79	76	Radiography Exposures	9566	10975	11119
	<b>Total</b>	<b>7465</b>	<b>8963</b>	<b>7745</b>	<b>Total</b>	<b>11563</b>	<b>12996</b>	<b>13859</b>

7

# Marketing including export

( Supply of spares to Zonal Railways )



# 7. Supply of spares

## 7.1 LIAISON & SERVICES WING:

There are 27 Electric Loco Sheds and 7 POH/Repair shops on the Indian Railways, which are engaged in the operation/maintenance of Electric Locomotives. The Liaison and Service (L&S) Wing of CLW has to perform the task of meeting the requirements of Capital spares allotted by Railway Board & Railways own needs of Spares for their loco sheds and workshops. Broadly Liaison and service wing performs the following functions.

## 7.2 FUNCTIONS:

The salient functions of L& S wing are as under:

- Consolidating the demands in the form of Requisitions/indents from Railways for purchased, Shop manufactured as well as imported items.
- Co-ordination with Stores department for the procurement of purchased items and to issue work orders from the shop manufactured item.
- Supplying spares to railways through stores/shops taking due care of demands and availability. L&S wing also maintains the accountal of such supplies.
- Monitoring of Performance of new locomotives built by CLW and dispatched to various Electric loco sheds, by way of getting feedback from the Railways.
- With the population of Electric Locomotives increasing steadily, the task of Liaison and Sales Wing has increased for effective monitoring of the performance of newly built Electric locomotives and for providing support for the capital spares as well as the requirement of spares by the Railways for maintaining the Locomotives in service.

## 7.3 SPARES TO RAILWAYS:

The supply of spares to various user Railways is one of the most important function of L&S wing. All-out efforts are made to fulfill the demands of Capital spares as well as the requirement of spares by the Railways. In the year 2013-14 spares worth Rs90.77crores (as on 31.12.13) were supplied to the Railways as compared to Rs. 93.97 crores in the year 2012-13. The break up of the same may be seen at Annexure -A.

**Supply of spares to Zonal Railways against Rly. Board's RSP & Requisitions of Zonal Railways in December-2013**

ANNEXURE - 'Aø (All Costs are in Rs. lakh)

Sl.	Item description	QUANTITY SUPPLIED DURING March 2012												Total qty.	Total cost of supply							
		CR B/Req	ECOR B/Req	ECR B/Req	ER B/Req	NCR B/Req	NR B/Req	SCR B/Req	SECR B/Req	SER B/Req	SR B/Req	WCR B/Req	WR B/Req									
1	TM for G-9/P-7 (3 )																	2	2	44.39		
2	TM for P-5 (3 )																					
3	Stator of TM for G-9 (3 )																					
4	Rotor of TM for G-9 (3 )																					
5	Rewind Stator (3 )																					
6	Transformer of G-9 (3 )																					
7	Transformer of P-5 (3 )																					
8	Auxiliary Converter (3 )																					
9	Central Electronics (3 )																					
10	Traction Converter (3 )																					
11	Speed Sensor (3 )																					
12	Master Controller (3 )																					
13	O.C.U (Blower + Radiator) (3 )					2														2	6.60	
14	HB-1/HB-2 (3 )																					
15	E-70 Brake System (3 )																					
16	Access tool/ Diagnostic System (3 )																					
17	Trade brake arrangement(3 )																					
18	TM (Hitachi)	3				5			5			3	6	3						25	782.25	
19	TM (H)-Armature																					
20	Transformer 5400 KVA																					
21	Static Converter																					
22	VCB																					
23	DBR (Roof Mounted)																					
24	DBR (Vertical)																					
25	RSI																			1	1	16.04
26	Tap Changer																					
27	Microprocessor Based Control & Fault Diagnostic System																					
28	DI/DU Relay																					



**Supply of spares to Zonal Rlys against Rly Bd's RSP & requisitions of zonal Rlys from April 2013 to Dec.2013**

**(ANNEXURE-B) (All Costs are in Rs. Lakh)**

Sl.	Item description	QUANTITY SUPPLIED FROM 01.4.13 TO 31.12.13														Total qty.	Total cost of supply								
		CR B/Req	ECOR B/Req	ECR B/Req	ER B/Req	NCR B/Req	NR B/Req	SCR B/Req	SECR B/Req	SER B/Req	SR B/Req	WCR B/Req	WR B/Req												
1	TM for G-9/P-7 (3 )				2*	3					3	2	2			2		2				16	387.64		
2	TM for P-5 (3 )																								
3	Stator of TM for G-9 (3 )																								
4	Rotor of TM for G-9 (3 )								3			8											13	89.46	
5	Rewind Stator (3 )																								
6	Transformer of G-9 (3 )																	2					2	247.84	
7	Transformer of P-5 (3 )																								
8	Auxiliary Converter (3 )					1														1			3	201.10	
9	Central Electronics (3 )						1														1		3	86.88	
10	Traction Converter (3 )					1															1		3	773.07	
11	Speed Sensor (3 )																								
12	Master Controller (3 )		2																				2	3.50	
13	O.C.B Unit (3 )		2			4	4				4												14	54.35	
14	HB-1/HB-2 (3 )																								
15	E-70 Brake System (3 )						1																1	33.40	
16	Access tool / Diagnostic System (3 )																								
17	Trade brake arrangement(3 )						2																2	51.51	
18	TM (Hitachi)	13	2	3		9	9	6	2		5		9		6	9	15		3			17	108	3059.26	
19	TM (H)-Armature																								
20	Transformer 5400 KVA			1												3							4	157.44	
21	Static Converter						1	1			2												4	95.14	
22	VCB					2															2		4	11.14	
23	DBR (Roof Mounted)																								
24	DBR (Vertical)																								
25	RSI		1			2			1		2					1						1	8	122.16	
26	Tap Changer																								
27	Microprocessor Based Control & Fault Diagnostic System																								
28	DI/DU Relay												12										12	53.62	
29	Smoothing Reactor (SL-30)												2		4								6	57.18	
30	Reverser-J																								
31	C.T.F																								
32	E.M.C																								



8

# STATUS OF M&P

## 8. MACHINERY AND PLANT

### **Manufacturing, M&P Maintenance, Transport, Machinery & Plant Procurement**

Manufacturing group of shops consists of Heavy machine shop, Wheel shop, Light machine shop, Smithy & Forge shop, Heat Treatment shop and Tool Room. Millwright and Electrical Maintenance shops look after maintenance of all M&Ps of loco works, power supply and distribution inside loco works. MPP cell deals with planning and process for procurement of machines sanctioned by Rly.Board under M&P Plan Head-4100 & 4200. It also looks after TPT shop including Road and Industrial vehicle maintenance work and shunting work. M&P section deals with commissioning of new heavy machines and warranty issues.

#### **8.1 Manufacturing shops:**

(i) Wheel Shop: **Wheel shop manufactures wheel sets for loco production as well as spares to Zonal Railways. Presently wheel sets for WAP4, WAP5, WAP7, WAG7 and WAG9 locos are manufactured.**

(ii) Heavy Machine shop: **Heavy machine shop undertake machining of components for loco production as well as meeting the spares required for zonal railways such as suspension tube, 3-ph stators for WAG9 & WAP5 locos, Hitachi Magnet Frame, Equalizer & Compensating beams etc.**

Machining work of Steel Castings from Steel Foundry like centre pivots of WAP4, CBC Coupler are also done in HMS.

(iii) **Smithy & Forge shop:** SFS undertakes fabrication of Head Stock of WAP7 loco, forging of small components of loco assembly, assembly of casnub bogie.

(iv) **Light Machine Shop:** Light Machine Shop manufactures small components like bushes, traction motor blower holding plates etc. to meet requirement of loco production as well as spares required for zonal railways.

(v) **Tool Room:** Tool room supplies toolings, gauges, jigs & fixtures for production requirements of various shops also carries out calibration of various gauges, fixtures, instruments etc to meet the ISO requirements.

(vi) **Heat Treatment Shop:** Heat Treatment Shop undertakes heat treatment of bogies manufactured in Loco Shop and other items e.g. Magnet Frame, Equalizer, Compensating Beams etc. manufactured in Heavy Machine Shop.

**Performance of Manufacturing Shop is furnished in the Annexure-‘A’**

#### **BRIEF REGARDING PLANT MAINTENANCE ORGANISATION (LOCO WORKS)**

CLW has more than 1500 M&Ps including 117 Nos. Cranes in Loco Works, out of which 50% of M&Ps are overaged. The breakdown as well as preventive maintenance of M&Ps is carried out by the Plant Maintenance Organisation consisting of Millwright Shop (MTS-56) and Electrical Repair Shop(Shop-59). Plant Maintenance Organisation deals with repairing, reconditioning, re-engineering, retro-fitment of machineries and plant. Installation of new small machineries and plants, condemnation & uprooting of old M&Ps are also carried out by the Maintenance Shops-56 & 59.

### **8.3 SPECIAL WORK DONE DURING 2013-14**

4. HMT CNC Profile Milling Machine (No. 05/2598/01), a vital machine of ELB Shop was under long breakdown due to defective PCU-50. The machine has been repaired successfully by providing new PCU-50 and backup software. The machine has been working satisfactorily since then.
5. Zayer -1 CNC Bogie Machining Centre, a very vital machine of Shop-18 for bogie machining was under breakdown from 21.12.2012 due to defective PCU of Siemens make. The warranty of the machine has also expired. The defective PCU has been repaired with the assistance of Siemens and the machine has been put back into service for production. The machine is running satisfactorily since then.
6. HYT Double Headed Boring Machine No. 08/1887/01, a critical machine of HMS, went under major breakdown due to spindle barrel jam, damage of spindle box nut bracket. The machine has been repaired thoroughly in-house by MTS without OEM's support and the machine is working satisfactorily for production of Hitachi Suspension tube.
4. 400T Hydraulic Press brake is a very vital machine for shell production. It went under breakdown from 24.06.13 due to defects in CN controller. The defective CN controller has been repaired inhouse by dedicated CNC team of ERS and the machine has been put back into service for regular production.
5. Craven Milling M/c No. 05/2310/03 of ELB Shop/05, a very old machine installed in the year 1951 went under breakdown due to failure of axis drive motor. The machine has been repaired inhouse jointly by MTS & ERS. The machine has been working satisfactorily since then.
6. BH-160-II Machine of ELB/Shop-18(M/c No. 18/2596/02) went under breakdown due to failure of AC drive motor for column movement. The machine has been repaired in house by ERS making alternative arrangement by providing DC Motor with suitable modified circuit. The machine has been handed over to production.
7. Zayer-1 CNC Bogie Machining Centre(18/2463/01) for Bogie Machining went under breakdown due to leakage of refrigerant through rubber hose pipe inside vertical head of the machine. Maintenance Wing(MTS) replaced the damaged pipes with copper pipes & re-aligned the same with connectors to arrest the leakage. The machine has been re-commissioned and handed over to production.
8. Denobat CNC Axle Turning Lathe(M/c No. 09/1114/01) of Wheel Shop installed in 2009 is a very vital machine for production of finished axle of wheel set. This machine went under breakdown on 09.9.13 due to heavy leakage of coolant from the conveyor housing. The defects have been repaired in house thoroughly by MTS.
9. The EOT Crane No. S/E/03 of NP Yard went under major breakdown due to crack of both LT gear box housing. The same have been repaired inhouse thoroughly, re-assembled by MTS and the crane has been handed over for use.
10. The EOT Crane No. S/E/03 of NP Yard went under major breakdown due to crack of both LT gear box housing. The same have been repaired inhouse thoroughly, re-assembled by MTS and the crane has been handed over for use.
11. Relaying of Main Compressor Pipe Line raising its height suitably has been done at five main locations between T.O Gate to ELF/Shop-26 area to facilitate infringement-free passage of high height consignments like wooden casing containing M&Ps and Loco shells coming from trade.
12. Bristol EOT Crane(No. 26/E/03) of Shell Shop-26 installed in the year 1963 went under breakdown from 19.09.13 due to wear & tear of LT Shaft, Brake Drum, Wheel bearings, Couplings etc. and the condition was such that it was not safe to operate. Major repair work on this crane has been done replacing the old and worn out parts and commissioned successfully.
13. Jordi Shearing M/c No. 15/7065/01 of Shop-15 had been giving trouble after commissioning in the year 2009. Finally, the machine went under breakdown on and from 25.02.12 due to defects in PLC. The machine has been repaired after procuring & installing new PLC and commissioned on 28.11.13.
14. Marufuku Plano Miller of ELB/Shop-18 is a very old but vital machine, installed in the year 1981. This machine went under breakdown from 26.10.13 due to complete damage of pendent cables cause by rodent.



The machine has been thoroughly repaired inhouse by Electrical Maintenance Wing with new rewiring and commissioned. The machine is being utilized by production shop for bogie machining since then.

### **8.3 SAVINGS IN MACHINE HOUR LOSS IN HRS.**

<b>Month</b>	<b>2012-13</b>	<b>2013-14</b>
<b>April</b>	<b>2749</b>	<b>2733</b>
<b>May</b>	<b>2716</b>	<b>2704</b>
<b>June</b>	<b>3165</b>	<b>3152</b>
<b>July</b>	<b>3070</b>	<b>3054</b>
<b>August</b>	<b>2716</b>	<b>2704</b>
<b>September</b>	<b>3421</b>	<b>3408</b>
<b>October</b>	<b>3426</b>	<b>3421</b>
<b>November</b>	<b>2878</b>	<b>2864</b>
<b>December</b>	<b>3374</b>	<b>3357</b>
<b>Total</b>	<b>27515</b>	<b>27397</b>

### **SAVING IN MACHINE HOUR LOSS**

Machine hour loss upto December, 13 during the year 2013-14 has been 27397 hours as against 27515 hours during the corresponding period of the previous year. Thereby, saving in Machine Hour loss till December, 13 has been 0.42% with respect to the previous year (2012-13).

### **8.5 UPTIME AVAILABILITY OF CRITICAL MACHINES**

The availability of 80 critical machines in Loco Works has been 95.64% during the year 2013-14 as against the target of 92%. The uptime availability of 80 critical machines was 94.72% during the corresponding period of the previous year (2012-13).

### **8.5 Production Performance of manufacturing shop**

Sl.No	Name of Item	2011-12	2012-13	2012-13 (upto Decø12)	2013-14 (upto Decø13)	Comparison of Prod. 2013-14 with 2012-13 Excess(+) Less(-)
1	Wheel Set Assembly	275 L/S	291 L/S	213 L/S	202 L/S	-11 L/S (Non-availability of WAG9/WAP7 wheel disc and main gear of WAP5)
2	Hitachi Susp. Tube	552 nos.	537 nos.	426 nos.	206 Nos.	- 220 nos. (Conventional loco target reduced by 22 L/S and material received from Trade)
3	Hitachi magnet frame	189 nos.	190 nos.	136 nos.	123 Nos.	-13 nos. (Non-availability of Steel Components of Magnet Frame Kit)
4	Stator 3 Phase	394 nos.	394 nos.	288 nos.	333 Nos.	+45 Nos.
5	Equalizer	139 L/S	120 L/S	93 L/S	82 L/S	-11 L/S (Conventional loco target reduced by 22 L/S)
6	Compensating Beam	141 L/S	120 L/S	94 L/S	82 L/S	-11 L/S (Conventional loco target reduced by 22 L/S)
7	WAG-9 Head Stock	39 L/S	47 L/S	31 L/S	42 L/S	+11 L/S

## **8.6 STATUS OF MPP & M&P SECTION.**

### **1. PLAN HEAD: 4100**

(i) INDENTS PLACED DURING THE YEAR 2013-14 (Position as on 01.01.14) :-

( From April 2013 to December 2013 )	COS	COFMOW	TOTAL
	07	Nil	07

(ii) MACHINES FOR WHICH P.O. DUE (Position as on 01.01.2014)

No. of Machines for which P.O. due		Total
COS	COFMOW	12
12	Nil	

(iii) P.O. PLACED DURING THE YEAR 2013-14 ( Position as on 01.01.14 )

COS	COFMOW	TOTAL
05	01	06

### **2. PLAN HEAD: 4200**

(i) INDENTS PLACED:- (Position as on 01.01.2014)

( From April 2013 to December 2013 )	COS	COFMOW	TOTAL
	Nil	Nil	Nil

(ii) MACHINES FOR WHICH P.O. DUE (Position as on 01.01.2014)

No. of Machines for which P.O. due		Total
COS	COFMOW	10
07	03	

(iii) P.O. PLACED DURING THE YEAR 2013-14 ó (Position as on 01.01.2014 )

P.O.PLACED	COS	COFMOW	TOTAL
	02	Nil	02

(iv) PROGRESS OF WORKS (M&P) :- ( as on 01.01.2014 )

Particulars	Total no. of m/cs. sanctioned	Dropped	Recd.	Under procurement
50 Loco Project :- Augmentation of facilities for enhancement in production capacity of 3-phase locos to 50 locos per year.(Total 11 items )	11	04	04	03
200 Loco Project :- Creation of addl. Facilities for enhancing the production capacity of CLW up to 200 locos per year.	30	04	20	06
275 Loco Project :- Modernisation & Augmentation of production capacity from 200 to 275 Elec.Loco per annum.	18	03	06	09
<b>TOTAL</b>	<b>59</b>	<b>11</b>	<b>30</b>	<b>18</b>

**3.Progress of works by M&P Deptt. (Position as on 01.01.2014)**

Particulars	M&Ps Received	M&Ps Under commissioning	M&Ps Commissioned.
M&P items sanctioned by Rly.Board under PH-41	03 ( from April to Decø13 )	09	09
GMø Out of turn items under Under PH-41	08 ( from April to Decø13 )	06	20
Project items ( 200 Loco Project & 50 Loco Project & 275 Loco Project . ) Under PH-42	03 ( from April to Decø13 )	03	06
<b>Total</b>	<b>14</b>	<b>18</b>	<b>35</b>

**Machines under Installation & Commissioning – 18 Nos. ( As on 01.01.2014 )**

(i) Plan Head ó 4100 ( M&P Prog.items)

S.N	Sanction	Case No.	Description, Qty & PO cost
1	M&P/ 07-08	MT/1879	Travelling Column Milling machine- 01no. <b>Cost ₹5.35 crore,</b>
2	M&P 08-09	MT/1890	Robotic Welding Plant with manipulator <b>Cost ₹ 4.44 crores,</b>
3	M&P 05-06	MT/1748	High speed continuous Sand Mixer with Sand Reclamation plant-01 no Cost ₹ 2.8cr
4	M&P 09-10	MT/2052	Routine Test plant for testing 3-phase asynchronous motor-01 no. <b>Cost ₹ 2.32crore.</b>
5	M&P 09- 10	MT 2045	Electric Arc furnace, Cost ₹ 6.16 crores,
6	M&P 10- 11	MT /2095	Mig welding m/c ó 38 nos, Cost (188632 EURO x 71.56)= ₹ 1,34,98,505
7	M&P 10- 11	MT/2093	Mig welding m/c ó 30 nos, Cost (148920 EURO x 71.56) = ₹ 1,06,56,715
8	M&P 10-11	MT /2097	Axle grinding m/c. (Morara), <b>Cost ₹ 45744587.7 lakhs</b>
9	M&P 07-08	MT/ 1904	Plasma Cutting m/c. Cost ₹ 1.42 Crores.

(ii) PH-4100 ( GMø Out of Turn Items )

Sl. No	Sanction.	Case No.	Description, Qty. & PO Cost
10	OT/ 09-10	MT/2082	Centre Lathe- 01 no. Cost ₹ 9.42 lakhs,
11	GM 08-09	MT/1998	Radial Drilling m/c., Cost ₹ 21.75 lakhs
12	GM 08-09	MT 2003	Radial Drilling m/c. Cost ₹ 21.75 lakhs
13	GM/OT 09-10	MT/ 2069	Universal Testing m/c 100T., Cost ₹ 17.51 lakhs
14	GM / 08-09	MT / 2001	Air compressor 1000 CFM, ₹ 27.89 lakhs
15	GM / 11-12	MT/2147	Calibration system, ₹ 29.93 lakhs

(iii) Plan Head-4200

Sl. No	Sanction	Case No.	Description, Qty. & PO Cost
16	275 Loco	MT/AP/275/07	Axle Turning M/c, Cost ₹ 1.69 crores
17	275 Loco	MT/AP/275/08	Axle Turning M/c, Cost ₹ 1.69 crores
18	PH 42, 50 Loco	(MT/AP/50/048 )	Paint booth, ₹ 7.4679 crore

### 8.7 Machines Commissioned – 35 Nos. (from April'13 to 01.01.2014)

M&P Prog.Items ( PH-41 ) : -09 Nos.

Sl No	Item No. & Yr. of san.	Description & Qty.	MT No	Supplier's Name/A.T / PO no.	Consignee/ Location
1	M&P 06-07	CNC Vertical Turret Lathe, Max. Turning Dia.800mm, Cost ₹ 4.16 crore.	MT/ 1787	M/s. Premier Ltd./Pune, P.O no.05/ 2007/7068/90211 dt.01.12.2010.	Dy.CME/Mfg. , WS-09.
2	M&P 07-08	Advanced Fire Fighting system, cap.600Ltrs. /01no., Cost ₹24.04 Lakhs	MT/ 1932	M/s. Udyogi Plastic Ltd. Kol, P.O no.05/2007/ 7020/71756 dt.03.07.08	SC/RPF At CRJ
3	M&P 07-08	Loco lifting Hyd Jack	MT/ 1921	M/s. Hydrodyne, Sitarampur, P.O no.05/2007/7063/71763 dt. 21.08.09	Dy.CME/ ELA
4	M&P 09-10	Heavy Duty Universal machining Centre with automatic Pallet Changer- 01no. Cost- Euro 14.4lakhs, Indian components- 35 lakhs	MT/ 2043	M/s. MAG India Industrial Automation Systems Pvt. Ltd., Bangalore, G-539 opened on 29.03.2010,	Dy.CME/ Mfg. HMS-09, bay-10
5	M&P 11-12	Truck, Cap-10T, 01 no., Cost ₹ 12.08 lakhs	MT/ 2129	M/s. Tata Motors Ltd., Mumbai, P.O no.05/2011/ 7003/91931 dt.07.12.2011	Dy.CME/MPP
6	M&P 11-12	Bus 32 Seater- 01 no.	MT/ 2128	M/s. Tata Motors Ltd., Mumbai, P.O no.05/2011/ 7004/91982 dt.07.12.2011.	AWM/TPT
7	M&P 11-12	Crane EOT-5T, 1 no., Cost ₹ 20.02 lakhs	MT/ 2134	M/s. Indiana Machine Tools, Mandigobindgarh, OP-2117	Dy.CME/Mfg.
8	M&P 11-12	Dumper Truck 10T, ₹16.18 lakhs	MT/ 2126	M/s. Tata Motors, P.O no. 05/2013/ 7001/ 01556 dated-20.03.13.	Dy.CME/MPP
9	M&P 12-13	500T Wheel Press. ₹ 276.93 lakhs	MT / 2148	M/s.A.J.Machine Tools, AT No. COFMOW, G-601	Dy.CME / Mfg.

GM Out of turn Items (PH-41):- 20 Nos.

Sl No	Item No. & Yr. of san.	Description & Qty.	MT No	Supplier's Name/A.T / PO no.	Consignee/ Location
10	GM OT/ 07-08	Combination therapy unit, 01 no.	MT/ 1972	M/s. International Electro Medical Co., NDLS, 05/2007/7099/71780 dt.17.09.08.	CMS/KGH
11	GM OT 08-09	S.J. Coil Winding machine-01no., Cost ₹ 5.99 lakhs,	MT/ 2026	M/s. TAMKAN, Asansol, P.O no. 05/2008/7114/71889 dt.17.02.10.	Dy.CEE/TMM
12	GM OT 08-09	Rad. Drilling m/c. Cost ₹ 21.75 lakhs	MT. 1999	M/s. Energy Tools, Gujrat, OP-1991 dt. 14.09.10	Dy.CME/Mfg.
13	GM OT 08-09	Hydraulic Crimping machine- 02 nos., Cost ₹ 9.36 lakhs.	MT/ 2035	M/s. Santragachi Engineering Co., Howrah, P.O no. 05/2008/71133/89774 dated-13.08.10.	Dy.CEE/EL
14	GM OT 08-09	Rotary Gellation Plant -02 nos Cost ₹ 17.64 lakhs	MT/ 2024	M/s. Heatem Engineering Co., P.O no. 05/2008/7115/89897 dated-14.09.2010.	Dy.CEE/ TMM, VPI shed, shop-23
15	GM OT/ 09-10	Digital Surge Comparison Tester with concomitant accessories- 04 nos Cost ₹ 16.13 lakhs	MT/ 2064	M/s. Vivid Metrawatt, Mumbai, P.O no.05/2009/7111/90824 Dt.28.03.11	Dy.CEE/ TMM, shop-23
16	GM OT/ 09-10	VCB Trolley 1250 Amps., 01 no. Cost ₹ 3.90 Lakhs	MT/ 2074	M/s. Allied Engineers, Kolkata P.O no.05/2009/7138/00603 dated-12.10.12.	Dy. CEE/M
17	GM OT/ 09-10	VCB Trolley 630 Amps., 06 nos, Cost ₹ 22.42 lakhs	MT/ 2076	M/s. Allied Engineering, Kolkata, P.O no. 05/2009/ 7139/00743 Dtd-12.11.12.	Dy. CEE/M
18	GM OT/ 09-10	Radial Drilling M/c. -1 no., Cost ₹ 18.3 lakhs	MT/ 2071	M/s. Energy Machine Tools Pvt. Ltd., Jamnagar, OP-2006 dated- 28.10.10	Dy. CME/ Mfg
19	GM OT 09-10	Cable fault locator, Cost ₹ 25.59 lakhs	MT/ 2077	M/S Bluemax Entreprise, Kolkata, P.O no.05/2012/ 7112/ 01602 dated- 10.04.2013	Dy.CEE(M)



20	GM OT 09-10	Spilt Casing Pump, -04 nos. ₹ 23.24 lakhs.	MT/2073	M/s.Electromechanical , Kolkata P.O.No.05/2009/7137/00171 dtd. 31.8.12.	Dy.CEE ( M )
21	GM OT/ 09-10	Induction Heater -01no., Cost ₹ 59.2 lakhs	MT/ 2080	M/s. Precision Instruments & Allieds, Mumbai, P.O no. 05/ 2009/7117/90713 dtd-15.03.11	Dy.CEE/TMM
22	GM OT 10-11	Autoanalyser , Cost ₹ 10.76 lakhs	MT 2122	M/s. Tulip Diagonistics Pvt Ltd, Goa, P.O no.05/2011/ 7119/ 92768 dated-13.12.12	CMS/KGH
23	GM OT 10-11	Radial Drill Machine- 01no. Cost ₹ 16.07 lakhs	MT/ 2101	M/s. Energy Machine Tools Pvt. Ltd. Jamnagar, OP-2094 opened on 21.10.11.	Dy. CME/ Mfg
24	GM OT / 11-12	ICU Ventilator, 01 no. Cost ₹ 16.19 lakhs.	MT/ 2142	M/s. Sigma Medical System, Kol, P.O no.05/2012/7110/01087 dated- 07.01.2013.	CMS/KGH
25	GM OT / 11-12	Defibrillator with Bedside Monitor, 01 no. Cost ₹ 2.37 lakhs	MT/ 2139	M/s. P. Bhogilal Inc. Kolkata, P.O no. 05/2012/ 7106/00950 Dtd- 11.12.12.	CMS/KGH
26	GM OT / 11-12	Spiro meter, Qty. 01 Cost ₹ 1.44 lakhs(P)	MT/ 2145	P.O no. 05/2012/7105/00698 dated- 30.10.12	CMS/KGH
27	GM OT / 11-12	Non-Motorised bed with mattress, 12 nos. Cost ₹ 8..33 lakhs	MT/ 2144	M/s. Vyas & Co., Asansol, P.O no.05/2012/7113/01037 dated- 24.1.2.2012.	CMS / KGH
28	GM OT / 11-12	Screw Air Compressor, 1000 cfm / Cost ₹ 27,51,785(S), 23,75,612(P)	MT/ 2138	M/s. Godrej & Boyce Mfg. Co. Ltd., Mumbai, OP-1908 dated- 03.09.2010.	Dy. CME/ Plant
29	GM OT 11-12	Remote Operated Multi- functional OT Table,	MT 2146	M/s. Janak Traders, P.O no. 05/2012/7107/00838 dt 22.11.12.	CMS / KGH

Project Items ( PH-42 ) ó 06 Nos.

Sl No	Item No. & Yr. of san.	Description & Qty.	MT No	Supplier's Name/A.T / PO no.	Consignee/ Location
30	50 Loco Project	Battery Charger set, 3 nos. Cost ₹ 6.79 lakhs	MT/ AP-050/ 046	M/s. Rayco Electro Enterprise, Kol, P.O no. 05/2009/7009/92175 dt.13.01.12.	Dy.CEE/EL
31	200 Loco Project	S.S. pipe cutting m/c.-02 nos. ₹ 7.45 lakhs.	MT/ AP- 200/ 030	M/s. Indo Tech Machines Pvt. Ltd. Indore, P.O no. 05/2007/ 7215/71895 dt.19.03.10	Dy.CME/ELA
32	200 Loco Project	Varnish Spary Booth	MT/AP 200/022	M/s. Bullows Paint Equipt. Mumbai P.O. No. 05/2007/7208/71806 dated. 24.12.08.	Dy.CEE/TMM
33	200 Loco Project	E.O.T crane, (Pendent Operated),	MT/ AP-200/ 032	M/s. Krane Mfg. (India) Pvt. Ltd.), Thane, P.O no. 05/2007/7220/ 71856 dt.11.08.2009	Dy.CEE/TMM , Bay-5A (Extension), 3-Phase Bay (VPI-III shed)
34	275 Loco Project	Auto Lister truck(10 nos), Cost ₹ 31.77 lakhs	MT/AP- 275/013	M/s. Godrej & Boycee, P.O no. 05/2012/7055/ 00881 dt. 30.11.12	Dy.CMM/ Depot
35	275 Loco Project	Induction Brazing Plant for rotor- 1 set	MT/AP- 275/04	M/s. VEL ELECTRONICS, Mumbai, PO no.05/2012/ 7056/02085 dated- 03.07.13.	Dy.CEE/TMM

## 8.8 Important M&Ps under acquisition.

vi.	Commutator Tig Welding machine.	-	Traction Motor Shop
vii.	Horizontal Boring machine	-	Heavy Machine Shop.
viii.	Pipe Threading machine	-	Loco Assly. Shop.
ix.	Laparoscopic Gynaecological Instrument	-	K.G.Hospital.
x.	Video Gastroscope Colonoscope	-	K.G.Hospital.

## 8.9 Transport Shop :-

Transport Shop maintains all road vehicles consisting of passenger vehicles like cars, jeeps, mini buses etc. for movement of officials and industrial vehicles like forklifts, dumpers, tractors, platform trucks/ listers for movement of material inside and outside the shops.

Available Maintenance of Material handling equipments (as on 01.01.2014 ):-

FLT : 32 Nos.

PLT : 23 Nos.

Tractor : 02 Nos.

Truck: 06 Nos., Tripper- 03 Nos. Bus: 02 Nos.

Shunting Locos: 03 Nos.

Passenger Vehicles: 23 Nos. - Maintained through in-house and outside agencies.

## 8.10 Yard Organisation:-

For movement of traffic wagons, inward and outward departmental wagons and locomotive shell on dummy bogies, three shunting engines have been deployed. These locomotives are maintained and operated by Yard Staff. Yard Organisation also keeps liaison with the Asansol Division of E.Railway for movement of traffic wagons.

## 8.12 OVERVIEW OF STEEL FOUNDRY

Steel Foundry/CLW was set up in the year 1963 in collaboration with M/s F.H. Lloyd of United Kingdom for production of steel castings for Steam Locomotives produced in CLW/Chittaranjan.

Steel Foundry adopted state-of-the-art-technology provided by M/s Rockwell International Corporation, USA in the year 1990-91. Today Steel Foundry is independently capable of carrying out method design and developing moulding practices for any new product.

Steel Foundry/CLW has been accredited with CLASS-A0 FOUNDRY certificate by RDSO on 9<sup>th</sup> August 2012.

### 8.12 PRODUCT RANGE

#### 8.12.1 STEEL CASTINGS:

##### Loco-items—

- Flexi coil Bogie for WAP-4 loco.
- Flexi coil Bolster for WAP-4 loco.
- Co-Co Bogie BG for WAG-5 & WDM-2 Loco.
- Suspension Tube for Hitachi TM.
- Suspension Tube for 3phase TM.
- Rotor Clamp for Hitachi TM.
- Commutator Spider for Hitachi TM.
- Centre Pivot for WAP-4 loco.

- Ballast Blocks for WAG-9 loco.
- Ballast Block for IGBT loco.
- Ballast Weights for WAG-7 loco.
- Loco Couplers for Electric loco.
- Striker Castings for Electric loco.
- -Eøtype Couplers for Diesel loco

**Wagon Items—**

- Casnub Bogie for BOXNHL wagons
- Casnub Bolster for 22HS/BOXNHL wagons
- Casnub Side Frame 22HS/BOXNHL wagons.
- Bogie Centre Pivot Top 22HS/BOXNHL wagons
- Bogie Centre Pivot Bottom 22HS/BOXNHL wagons

**C.B.Coupler Items—**

- Knuckle for CB Coupler.
- Coupler Body for CB Coupler.
- Yoke for CB Coupler.
- Striker Castings for CB Coupler.

**Spares for Zonal Railways—**

- Suspension Tube for WDM-3D loco.
- Wheels for Tower Car.
- Wheels for Power Car
- Wheels for Narrow Gauge Coaches.
- Wheels for Narrow Gauge loco.

**8.12.2 DEVELOPMENT OF NEW STEEL CASTING ITEMS:**

**(a) DEVELOPED & SUPPLIED REQUIRED TO RAILWAYS-**

- ❖ CB Coupler for Electric Locomotives
- ❖ Striker Casting for Electric Locomotives
- ❖ -Eøtype Coupler for Diesel loco

**(b) UNDER DEVELOPMENT-**

- ❖ Casnub Side Frame & Bolster for BLC Wagon
- ❖ GM bogie for DLW made WDG4 loco
- ❖ -Høtype Coupler for Diesel Loco
- ❖ Clevis for Coupler items



E-type Coupler for WDG-4 Loco

**8.12.3 FABRICATED ITEMS for LOCO:**

- Long Beam for WAP4
- End Structure for WAP4
- End Structure for WAG7
- End Box for WAG7



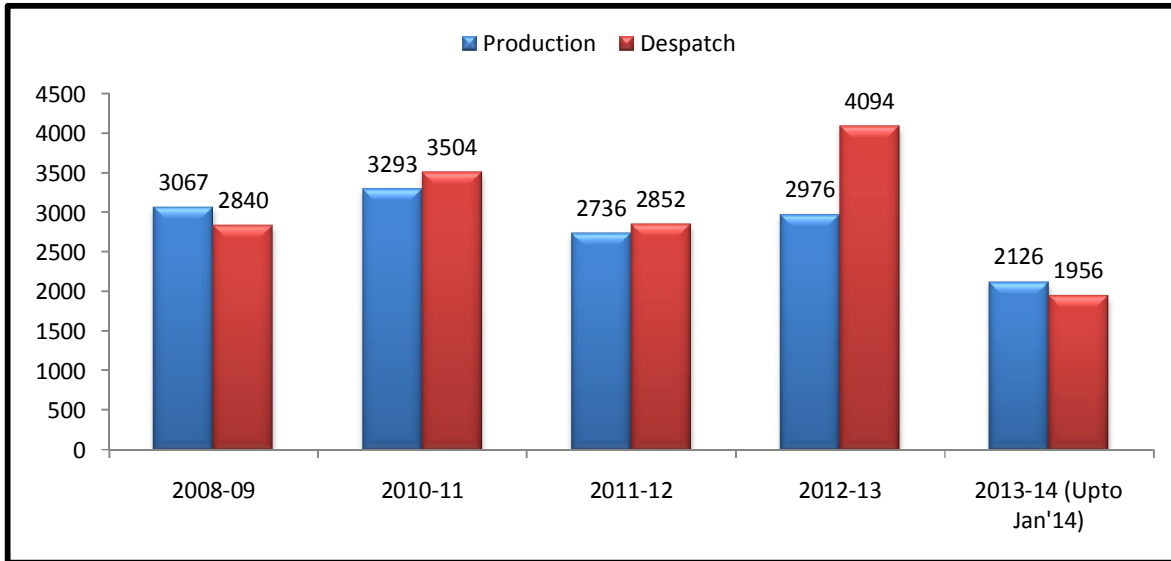
Cow Catcher

- Long Beam for WAG-7
- Roof Hatch Assembly for WAG-9/WAP-4 locos
- Head Stock for WAG-9/WAP-7 loco
- Centre Sill for WAG-9/WAP-7 loco
- Side Sill for WAG-9/WAP-7 loco
- Central Under Frame for WAG-9/WAP-7 loco
- Middle Box for WAG-7 loco

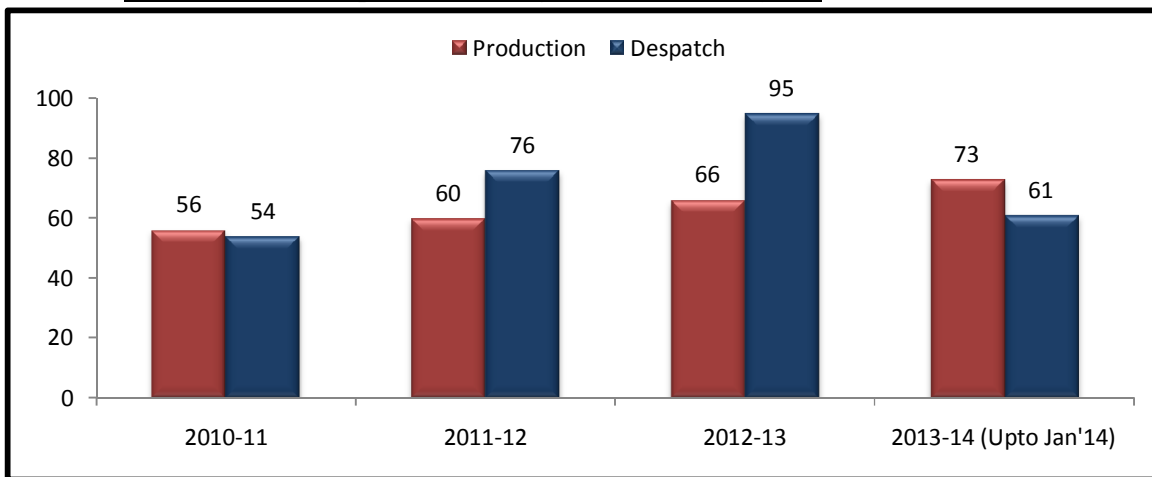


**8.14 OUTTURN PERFORMANCE:**

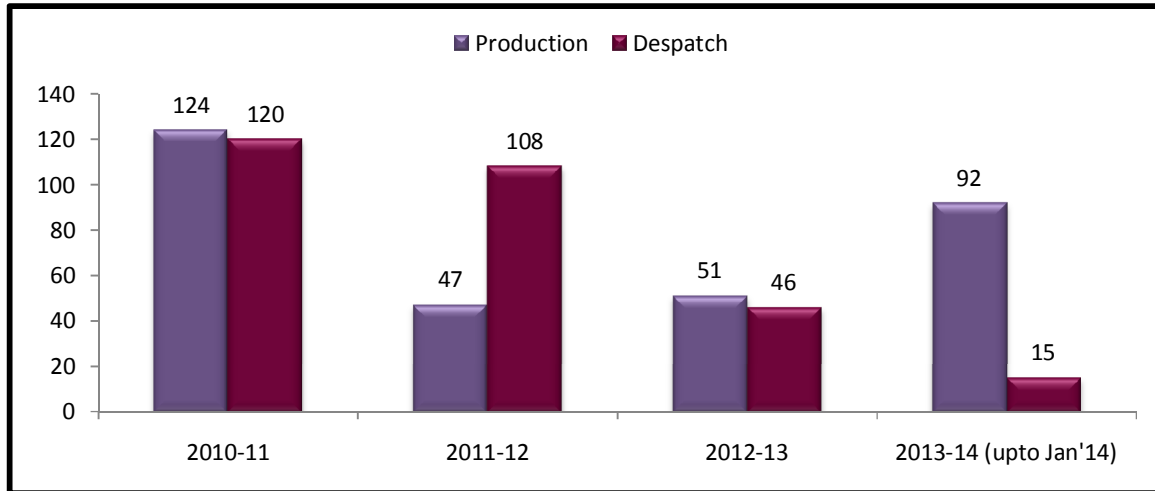
**8.13.1 Production & Despatch of Steel Castings over last five years**



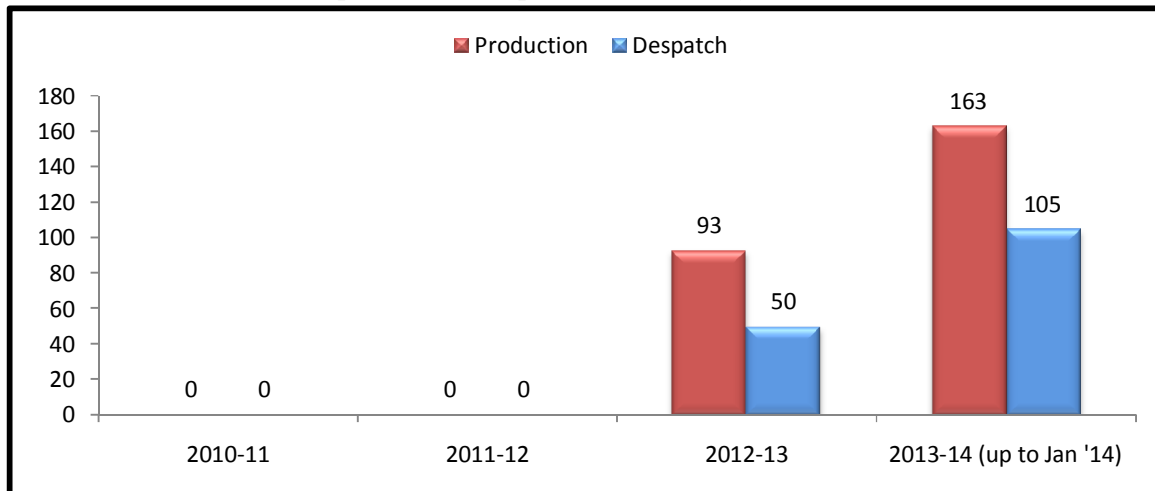
**8.13.2 Production and Despatch of FC Bogies over last Four years**



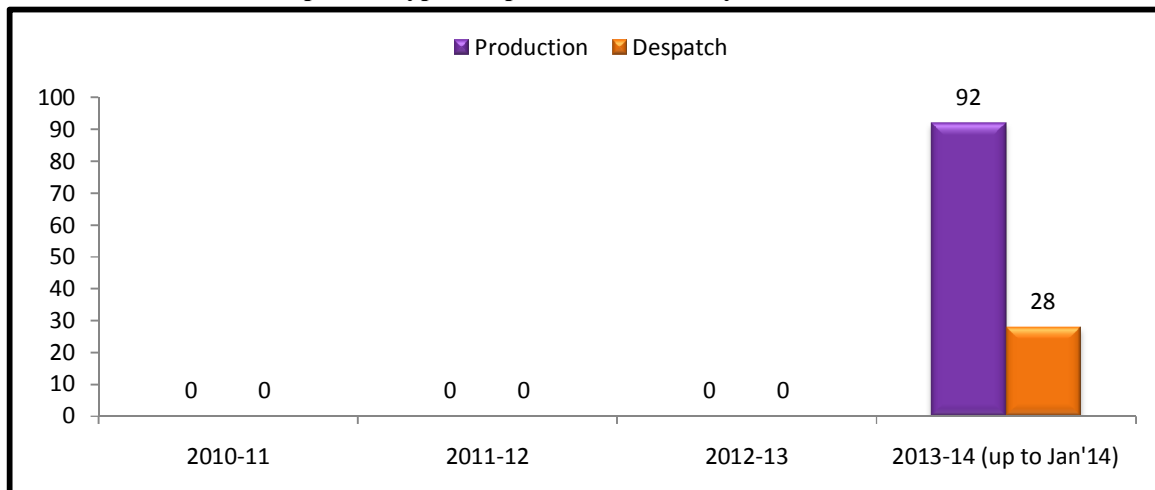
**8.13.3 Production & Desp. Of RIC Bogie Castings over last four years—**



**8.13.4 Production & Desp. Of Loco Coupler over last four years—**



**8.13.6 Production & Desp. Of E-type Coupler over last four years—**



#### 8.14 QUALITY:

Steel Foundry/CLW, despite following Green Sand moulding system, is endeavoring to contain the rejection level within 3%. Rejection percentage for the last 5 years is produced below which show that they are contained within the targeted limit.

Years	Total Cast (in MT)	Rejection (in MT)	Target	Rejection Percentage
2009-10	3529	84	3 %	2.38 %
2010-11	3362	69	3 %	2.05 %
2011-12	2736	56	3 %	2.05 %
2012-13	2976	64	3 %	2.15 %
2013-14 (up to Jan 14)	2126	43	3 %	2.02 %

#### 8.14.1 QUALITY ASSURANCE MEASURES:

(a) **Switching over to Metal Patterns/Core-boxes-**

With an objective to eliminate the casting defects owing to over-aged wooden patterns/core-boxes, induction of metallic patterns/core-boxes has been introduced.

In this regard, Hitachi Suspension Tube, Knuckle, Coupler Body etc. for locos & wagons, metallic patterns and core boxes have been procured from out agencies. The quality of the relevant castings pertaining to dimension and surface finish has been improved.

(b) **Mechanization of Foundry Process—**

Steel Foundry/CLW is in the process to adopt the Synthetic Sand Moulding System to overcome the casting defects like- sand inclusion, poor surface finish, blow holes etc. being induced by the existing Green Sand Moulding Practice.

(c) **Other Steps—**

In addition, following actions are being taken to improve upon quality/reduction in rejections

- Periodical checking of patterns & core boxes on quarterly basis.
- Use of exothermic sleeves to eliminate chances of shrinkage and cavities & to increase yield.
- Use of branded Zircon based mould washes to improve surface finish.
- Use of pouring ponds and tiles of high refractoriness in metal flow areas.
- Strict control over carbon boiling during melting to avoid pouring of gassy metals.
- Use of quick lime has been introduced to bring down phosphorous content of melt.
- Strict control on heat cycle during heat treatment of castings to achieve prescribed physical properties.
- 100% load testing of Bogies & Bolsters to improve reliability in service.

(d) **Customer Feedback—**

A pro-active step to call for the quality feed-backs from the customers has been initiated. All the customers are regularly being requested to provide feed-backs on the quality of items supplied from Steel Foundry/CLW. The reports have been analysed and appropriate corrective & preventive actions have been worked out, implemented and replied. Those railways, who have not responded, are being reminded regularly. The feed-backs are providing vital inputs for improvement in the quality and reliability of our products.

**8.15 PRODUCTIVITY:**

Load Lifted per Direct Worker The **Allowed Time Discharged per Direct Worker per Month** for the last 4 years has been as follows:

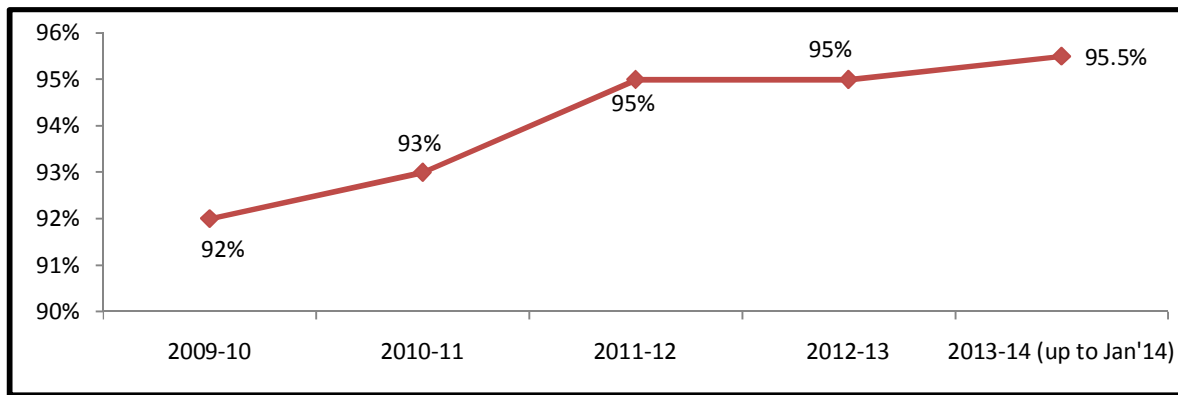
Years	2010-11	2011-12	2012-13	2013-14 (up to Jan'14)
AT Discharged	250 hrs.	246 hrs.	253 hrs.	260 hrs.

**8.16 PLANT MAINTENANCE ORGANISATION:**

Steel Foundry has total no. of 390 M&Ps. The breakdown as well preventive maintenance of all the 390 Nos. of M&Ps carried out by Plant Maintenance consisting of Millwright Section (MTS-63 Shop) & Electrical Repair Shop (ERS-64). Plant maintenance organization deals with the re-conditioning, re-engineering, retro-fitment of the machinery & plant, installation of new machinery & plants, condemnation and uprooting of old M&Ps are also carried out by these sections.

AVAILABILITY OF CRITICAL M&PS

Availability of critical M&Ps for production for the last five years is depicted below.





**Annexure IV**

**CONSOLIDATED LIST OF PENDING WARRANTY FAILURE CASES FOR CONVENTIONAL  
LOCOS (As on 31.3.13)**

Sheds	CR	ECoR	ECR	ER	NCR	NR	SCR	SECR	SER	SR	WCR	WR	Total
BSL	70												70
AQ													
ANGL		401											413
VSKP		12											
WAT													
GMO			27										39
MGS			12										
HJP													
HWH				18									28
ASN				9									
KPA				1									
CNB					31								46
JHS					15								
GZB						4							19
LDH						15							
CB													151
KZJ							34						
LGD							45						
BZA							72						
BIA								105					106
BSP								1					
BNDM									157				317
SRC									109				
TATA									51				
KGP													43
AJJ										29			
ED										14			
PER													181
ET											122		
NKJ											48		
TKD											11		
BRCY												21	21
BL													
DHD													
Total	70	413	39	28	46	19	151	106	317	43	181	21	1434

## Annexure IV contd.

## CONSOLIDATED LIST OF PENDING WARRANTY FAILURE CASES FOR 3-PHASE LOCOS (As on 31.3.13)

Sheds	CR	ECOR	ECR	ER	NCR	NR	SCR	SECR	SER	SR	WCR	WR	total
BSL	4												21
AQ	17												
ANGL													
VSKP													
WAT													44
GMO			42										
MGS													
HJP			2										
HWH													
ASN													
KPA													
CNB													
JHS													68
GZB						68							
LDH													
CB													
KZJ													563
LGD							563						
SC													
BZA													
BIA								348					359
BSP								11					
BNDM													36
SRC													
TATA									36				
KGP													
AJJ													65
ED													
PER													
ET													
NKJ													65
TKD											65		
BRCY													
BL													
DHD													1156
total	21		44			68	563	359	36		65		

9

# STAFF POSITION

## 10. STAFF BREAK UP

STAFF BREAK UP DEPARTMENT WISE Gr. C & D (AS ON 31.12.13):

DEPARTMENT	SANCTIONED STRENGTH	STAFF ON ROLL	VACANCY
<b>ACCOUNTS</b>			
GROUP 6C	502	330	172
GROUP 6D	43	58	-15
Total	545	388	157
<b>ADMINISTRATION</b>			
GROUP 6C	619	454	165
GROUP 6D	245	251	-6
Total	864	705	159
<b>CIVIL</b>			
GROUP 6C	398	266	132
GROUP 6D	494	441	53
Total	892	707	185
<b>ELECTRICAL</b>			
GROUP 6C	2774	2161	613
GROUP 6D	455	503	-48
Total	3229	2664	565
<b>MECHANICAL</b>			
GROUP 6C	5862	4952	910
GROUP 6D	1053	1019	34
Total	6915	5971	944
<b>MEDICAL</b>			
GROUP 6C	200	151	49
GROUP 6D	420	249	171
Total	620	400	220
<b>PERSONNEL</b>			
GROUP 6C	299	282	17
GROUP 6D	0	0	0
Total	299	282	17
<b>RPF</b>			
GROUP 6C	508	389	119
GROUP 6D	27	23	4
Total	535	412	123
<b>S &amp; T</b>			
GROUP 6C	41	35	6
GROUP 6D	12	14	-2
Total	53	49	4
<b>STORES</b>			
GROUP 6C	632	449	183
GROUP 6D	395	249	146
Total	1027	698	329
<b>GRAND TOTAL</b>			
<b>GROUP - C</b>	<b>11835</b>	<b>9469</b>	<b>2366</b>
<b>GROUP - D</b>	<b>3144</b>	<b>2807</b>	<b>337</b>
<b>TOTAL</b>	<b>14979</b>	<b>12276</b>	<b>2703</b>

10

# UNIT COST OF THE PRODUCT

## 10. UNIT COST OF THE PRODUCTS

(Figures in thousands of Rs.)

### e. 2010-11

Type of Loco	Direct Labour	Direct Materials	Over heads	Total(ex. Pro. Chgs.)	Pro. Charges	Total(in pro.charges)
WAP-4	42,60	4,20,38	1,39,72	6,02,70	9,04	6,11,74
WAG-7	36,15	4,50,31	1,20,44	6,06,90	9,10	6,16,00
WAG-9	55,29	11,05,36	1,92,97	13,53,62	19,63	13,73,25
WAP-7	55,29	11,32,79	1,93,10	13,81,18	20,02	14,01,20
WAP-5	55,29	11,54,61	1,93,54	14,03,44	20,35	14,23,79

### f. 2011-12

Type of Loco	Direct Labour	Direct Materials	Over heads	Total(ex. Pro. Chgs.)	Pro. Charges	Total(in pro.charges)	ED	Total (in.ED)
WAP - 4	4098	53558	11744	69400	1041	70441	700	71141
WAG-7	5001	50068	14031	69100	1036	70136	700	70836
WAG-9	5529	110536	19335	135400	1936	137363	1400	138736
WAP-7	5529	113279	19292	138100	2002	140102	1400	141502
WAP-5	5529	115461	19310	140300	2035	142335	1400	143735

### g. 2012-13

Type of Loco	Direct Labour	Direct Materials	Over heads	Total(ex. Pro. Chgs.)	Pro. Charges	Total(in pro.charges)	ED	Total (in.ED)
WAP - 4	4098	53558	11744	69400	1041	70441	1400	718411
WAG-7	5001	50068	14031	69100	1036	70136	1400	71536
WAG-9	5529	110536	19335	135400	1963	137363	2800	140163
WAP-7	5529	113279	19292	138100	2002	140102	2800	142902
WAP-5	5529	115461	19310	140300	2035	142335	2800	145135

### h. 2013 – 14 (upto31.12.13)

Type of Loco	Direct Labour	Direct Materials	Over heads	Total(ex. Pro. Chgs.)	Pro. Charges	Total(in pro.charges)	ED	Total (including ED)
WAP-4	3914	52800	11886	68600	1029	69629	1400	71029
WAG-7	4413	51856	12331	68600	1029	69629	1400	71029
WAG-9	5642	101094	18064	124800	1810	126610	2800	129410

WAP-7	5225	104136	16039	125400	1881	127281	2800	130081
WAP-5	5310	112428	16462	134200	2013	136213	2800	139013

11

# INDUSTRIAL SAFETY

## 11. SAFETY ORGANISATION

Safety Officer & Safety Inspectors regularly check the safety aspect in the shop floor such as use of Personal Protective Equipment, proper use of Material Handling Equipment, unsafe working practices etc. They also conduct safety inspections, investigations of accidents and recommended remedial measures. They also formulate plans for motivating staff for safety consciousness, use of safety equipment and compliance of statutory act and regulations.

To monitor Occupational Health Hazards, periodical Medical Check-up is done by Medical Department as per statutory regulation. Safety department in co-ordination with Medical Department frames the programme and maintain the records of the tests. It also maintains liaison with State Pollution Control Board. Environmental Engineers of WBPCB from Asansol & Kolkata regularly visits Steel Foundry/ CLW/Chittaranjan. Safety department with the help of approved agencies of WBPCB conducts regular tests of air and sound.

### 11.1 INDUSTRIAL SAFETY:

#### Accident Statistics of CLW during the last 5 years i.e 2008-09,2009-10,2010-11,2011-12,2012-13

Sl. No.	Year	No. of Accidents	Type of injury		
			Fatal	Major	Minor
1	2009	08	02	06	-
2	2010	09	01	07	01
3	2011	06	-	06	-
4	2012	07	-	07	-
5	2013	10	01	07	02

### 11.2 Measures taken for Improvement:

i. All the Shops and work sides are regularly inspected for "Plant Safety Inspection". All plants using flammable substances like acetylene and LPG etc. are inspected regularly and plant maintenance/operation units follow fire proof working procedures for safe operation and maintenance of these plants. Contractors engaged for maintenance of acetylene/oxygen/LPG plants are monitored regularly by Safety Units. Fire Prevention measures - like use of Flash back arrestor in acetylene cylinder and declaration of fire prone area as "NO SMOKING ZONE", rigorous training of staff by fire inspectors, demonstration of fire-fighting equipment at the working sites, regularly re-filling/repair of fire extinguishers are being followed for vulnerable zones. All the accident/dangerous occurrences are investigated and section/persons responsible are pinpointed and remedial measures taken to minimize such incidents.

ii. Regular checking is carried out in production shops regarding use of Personal Protective Equipment like Safety Shoes, Goggles, Helmet, Nose mask etc. Staffs are continuously motivated to wear PPEs and also apprised of the resultant hazards associated with non-use of such equipment.

iii. A proper vigil is regularly maintained to determine whether all critical equipments like Crane, chain, Pressure Vessel etc. are tested as per the Statutory Rules by the agencies approved by the State Inspectorate of factories. Do's and Don'ts for safe operation of crane has been circulated to concerned shops.

iv. Crane Drivers, Riggers, staffs engaged for Spray Painting, Electroplating, Battery Charging, Foundry work, operation and signaling to the cranes etc. are given regular medical check up to assess their vision, chest, lung function etc. in compliance with the statutory obligation.



v. Safety calendars, posters procured by safety deptt. are displayed at shop floor for safety awareness among the workers. As per the relevant provision of Factory Rules 1958 , Safety and Health Policy of CLW has been prepared duly signed by the CME and occupier and displayed the same in various locations through laminated boards. Staff are regularly counseled by the Chief Safety Inspectors / Safety Inspectors to adopt safe practices while they are at work .

vi. Fume Extraction System has been installed in shop no 26. The system is effective to extract the welding fumes arising out of welding operation thus maintaining upgraded environmental standard in the shop floor as well as to prevent the workers from being afflicted with any irreversible diseases by inhalation of the fumes.

vii. The safety action plan pertaining to various operations being carried out inside the factory premises has been chalked out and the same has already been distributed to all stake holders to ensure strict compliance of the same to user in safe practice while performing the respective job .

viii. Work-shop on safety are being held in collaboration with TTC where demonstration is made by Safety Deptt. with the aid of audio-visual mode based on the video footages filmed during the working hours to admonish the staff about the various processes of un-safe act and also an inter-active session is conducted in the work-shop to encourage participation by the workers .

ix. Plant Safety Audit and Work Area Monitoring have been conducted by the expert agency approved by the Inspector of Factories in different areas inside the Factory premises. The deficiencies found in course of the above work have been pointed out and the same have been brought to the notice of concerned authorities to make necessary rectification.

12

# FUTURE PLANS

## **IMPORTANT WORK PLAN DURING 2013-14**

6. One No. Universal Tensile Testing Machine, capacity 100 ton was procured through M&P (2012-13) & commissioned in Lab Loco.
7. Procurement of Vicker Hardness Tester through M&P(2012-13) under GMø's Out of Turn & P.O has placed, expected commissioning of Vicker Hardness Tester in the mid of the February 2014.
8. Procurement of Magnetic Particle Testing (MPT) Equipment through M&P(2012-13) case is under process.
9. M&C Laboratory of Main Lab Loco &SF Lab is in a project stage of computerization, upgradation of online test reporting system.
10. 500 Ton Hydraulic Pull Load Testing M/c is under procurement for high tensile CBC coupler & its components as per RDSO Specification 56BD07 & 48BD08 & E-Coupler &H-type Coupler for DLW.

13

# OTHER ISSUES

## 13 Other issues

- Up to Dec 2013, CLW has turned out 204 locos over and above against proportionate target of 203. The production of 3-phase locomotives is highest in current year. CLW has produced 106 three phase loco in current financial year upto Dec. compared to 110 in complete last financial year.
- CLW in the past has never turned out more than 8 three phase locos in any month. The capacity has been now stabilized to 14-15 per month.
- The manufacturers of three phase loco equipment have stepped up their production to meet the enhanced requirements. The assistance from Board in this regard is highly appreciated.

Chittaranjan Locomotive Works had been sanctioned "Creation of additional facilities for enhancement of production capacity up to 200 locomotives per year" at the estimated cost of Rs.92.51 Crores at first step. The major works are

- Additional Bay of Loco Fabrication Shops.
- Extension of Traction Motor Shops.
- Additional Machinery & Plant, Tools, Jigs & Fixture
- Production Control Information Management System
- Augmentation to various Ancillary Shops

The work was completed by June 2013 to enable CLW with higher productivity and step forward towards producing more 3-phase Locomotive.

The anticipated cost for augmentation capacity to achieve 275 locomotives per year in second phase is Rs.134 crores. The work is scheduled to be completed by June 2014.

- Dankuni project of CLW - Cost of the project is 270.77 Crores. The work is scheduled to be completed by June 2014.

1

# **INTRODUCTION**

# 1. INTRODUCTION :

- 1.1 The Works and Administrative office of Chittaranjan Locomotive Works (CLW) are located at Chittaranjan, Dist. Burdwan in West Bengal. In addition, there is a Stores Purchase office in Kolkata and CLW's inspection cells in New Delhi, Mumbai, Kolkata and Bangalore.
- 1.8 Chittaranjan Locomotive Works (CLW) is the first industrial gift to free India by the planners of this nation. The issue of setting up a locomotive building unit continued to be under active consideration of the Central legislature and in the late thirties, a committee consisting of M/s Humphries and Srinivasan was appointed to investigate the possibility of establishing a locomotive manufacturing unit and to consider its economic viability. The initial project at Chandmari, a place near Kanchrapara in the state of West Bengal, could not mature due to partition, which inevitably necessitated a change of site. The present site of Chittaranjan was selected after a fresh survey and Railway Board's approval was obtained in the year 1947. The locoworks was initially established for production of 120 average sized steam locomotives with the capacity to manufacture 50 spare boilers. Production of steam loco commenced on 26<sup>th</sup> January, 1950. The first President of India, Dr. Rajendra Prasad dedicated the first steam locomotive to the nation on 1<sup>st</sup> November, 1950 and on the same day the factory which was called Locomotive Manufacturing Works, was named after the great Patriot, Deshbandhu Chittaranjan Das. Production of Diesel Locomotive was taken up during 1968. After manufacturing 2351 Steam Locomotives of 5 types and 842 Diesel Locomotives of 7 types, production of Steam and Diesel Locos were discontinued from 1971-72 and 1993-94 respectively. CLW is now manufacturing main line Electric Locomotives only. Upto 31.12.13, 5132 Electric Locomotives have been produced of different class (AC/DC, AC, DC & 3- phase).
- 1.9 CLW has augmented its production capacity for Electric Locos in phases besides absorbing 3-phase technology i.e from 60 to 80 Locomotives, 80 to 100, 100 to 130 and 130 to 150.
- 1.10 Production of Traction Motors and control equipment commenced in April 1967. In the year 2012-2013, 1537 TM were produced.
- 1.5 Steel Foundry was set up in 1962-63 for production of steel castings for Steam Locomotives produced in CLW. It took up production of castings with the State of the Art technology provided M/S Rockwell International Corporation, USA in the year 1990-91.
- 1.12 CLW has in house facilities for machining and assembly of wheel sets, fabrication and machining bogies. The facilities include modern CNG machines, Plasma Cutting machines, Inert Gas Welding etc.
- 1.13 CLW has an exclusive Centre for Design and Development with CAD/CAM facilities.
- 1.14 There is a well-established quality assurance/inspection for incoming material and stage inspection and final inspection of the CLW manufactured items.
- 1.9 CLW has been sanctioned "Creation of additional facilities for enhancement of production capacity".  
The major works are:
11. Additional Bay of Loco Fabrication Shops.
  12. Extension of Traction Motor Shops.
  13. Additional Machinery & plant, Tools, jigs & fixture.
  14. Production control Information Management System.
  15. Augmentation to various Ancillary Shops.
- 1.10 CLW has acquired the ISO-14001 certificate on 26.4.2002 both for its works and township for a neat and clean environment.
- 1.11 Chittaranjan is a true example of Environment preservation and consciousness. Its lush green ambience talks of the efforts of the Administration as well as the residents of the township in the conservation of Environment, as well as using of all the existing natural resources in an eco-friendly manner. The concerted and unending efforts have been rewarded immensely by the World Environment Foundation and **the Golden Peacock award for Environment Management 2006 had been conferred on 9<sup>th</sup> June 2006.**

- 1.12 CLW has complied fully with the provisions of the Industrial Safety Act, 1948. CLW in its safety policy aims to ensure 100% safety for all workers working in Chittaranjan Locomotive Works. CLW is the proud recipient of the Safety innovation award 2006. The award was conferred on CLW on 6<sup>th</sup> September, 2006 by the Safety and Quality forum of the Institute of Engineers (India).
- 1.13 The 2<sup>nd</sup> IGBT technology based WAG-9i Class Freight loco No. 31234 has been successfully commissioned on 15<sup>th</sup> April, 2010. The first electric locomotive (WAP-7 type no. 30277) with Head on Generation (HOG) scheme was flagged off on 30<sup>th</sup> June, 2010.
- 1.14 The first WAP-7 loco no. 30279 was produced with brake rigging of WAP-7 design.
- 1.15 **Inauguration of e-Auction in CLW.**  
E-Auction was started in Chittaranjan Locomotive Works (CLW) on 24-01-2013. Shri Radhey Shyam, General Manager, CLW inaugurated this system with the mouse click on the CLW Website. This is the first time that e-auction process was started in CLW. This has conducted the e-auction process online through the IREPS (Indian Railways Electronic Procurement System) website of Indian Railways.
- 1.16 **All India Railway Bridge Championship in CLW.**  
The 35<sup>th</sup> All India Railway Bridge Championship, 2012-13 got underway at Chittaranjan Locomotive Works on 05-03-2013. A total of 38 participants from ER, SER, Metro, CR and CLW were participated in this all India level competition which was continued up to 8<sup>th</sup> March. Top ranking national level players vied for top spots in three different events, namely Swiss Event for team championship, Pairs and Board A match.
- 1.19 **Installation of PCMIS Facility in CLW**  
In another successful attempt to modernize its day-to-day activities, Chittaranjan Locomotive Works (CLW) has installed PCMIS package recently, during March 2013. This facility will revolutionize procurement and updating procedure in CLW. The package was handled by EDP Centre/CLW and developed by Ms. CMC Ltd.
- 1.18 **CLW'S ALL TIME HIGH RECORD LOCO DISPATCH**  
Chittaranjan Locomotive Works (CLW), the premier electric loco production unit of Indian Railways, has achieved ever highest production of 270 locomotives in the year 2012-13. Thus not only surpassed the Railway Board's target but also last year production figure of 258 locomotives, which was so far the best ever annual production in the history of this unit. CLW has made quantum jump in production of 3-phase electric locomotives from 76 nos in 2011-12 to 110 nos in 2012-13, an increase of 45% over last year.
- 1.19 **Celebration of Kaviguru Rabindra Jayanti in CLW.**  
The Birth Anniversary of Kavi Guru Rabindra Nath Tagore was celebrated on 9<sup>th</sup> May 2013 at the Chittaranjan Club in Chittaranjan Locomotive Works. Shri Radhey Shyam, General Manager/CLW paid floral tribute on the portrait of Kavi Guru and inaugurated the programme by lighting the traditional lamp as Chief Guest.
- 1.20 **Inauguration of Ventilator Machine and distribution of hearing aids in KG Hospital /CLW.**  
A ventilator machine was inaugurated by Shri Radhey Shyam, General Manager/CLW, in the Kasturba Gandhi Hospital of Chittaranjan Locomotive Works (CLW) on 24-06-2013. On the occasion, some hearing aids were distributed to the needy patients of CLW by Shri Radhey Shyam, General Manager.
- 1.21 **CELE's Coordination Conference in CLW.**  
An one day co-ordination meeting on customer feedback was held at Chittaranjan Locomotive Works (CLW) on 29<sup>th</sup> June, 2013 amongst the Chief Electrical Loco Engineers (CELEs) & Sr. Divisional Electrical Engineers (Sr. DEEs) of ten (10) participating railways to discuss how to improve the reliability of the CLW built 3-phase electric locomotives. The meeting was formally inaugurated by Shri Radhey Shyam, General Manager, CLW on 29<sup>th</sup> June, 2013 in the Administrative office meeting room.



### **1.22 Best ever production performance in first quarter.**

Chittaranjan Locomotive Works( CLW), a premier electric loco production unit of Indian Railways, has excelled in loco production by rolling out an all time high latest technology electric locomotives in its first quarter of 2013-14. Overall loco production has witnessed a quantum jump of about 25 % in the first quarter of current financial year 2013-14 in comparison to same period of 2012-13 . CLW has been able to produce a total of 69 electric locos in the said period of this fiscal in comparison to 55 locomotives in 2012-13 . The production of three-phase locomotive was only 11 during the first quarter of 2012-13 and it has crossed 27 in the same period of 2013-14 and thus recorded a leap of about 150 %.

In another development , CLW has also improved the production of traction motors, for providing motive power to the locomotives. In the first quarter of 2013-14, about 30 % increase has been recorded in the production of three-phase traction motors as it has produced 228 TMs in this quarter in comparison to 175 of the corresponding period of last year..

### **1.23 inauguration of new CNC Vertical Torret Lathe Machine**

In order to enhance the production capacity of Wheel Shops in Chittaranjan Locomotive Works (CLW), a CNC Vertical Turret lathe machine was commissioned and inaugurated by Shri Radhey Shyam, General Manager / CLW on 17-07-2013 inside the workshop. This machine, installed at a cost of Rs.4.16 crores, will help in enhancing the production of wheel assembly for more electric locomotive production from CLW.

### **1.24 Inauguration of new Auto-Analyzer Machine in KG Hospital/CLW**

An Auto Analyzer machine was inaugurated by Shri Radhey Shyam, General Manager/CLW, in the Kasturba Gandhi Hospital premises of Chittaranjan Locomotive Works (CLW), on 17-07-2013. It is expected that, this machine which is installed at a cost of Rs.10 lakhs., will help in getting the auto analysed blood test reports of CLW employees and their family members. It is to be noted that, the KG Hospital is adapting newer technology in providing better health services to the inhabitants of CLW.

### **1.25 Production & flagging off of 100<sup>th</sup> Locomotive of the year 2013-14 in CLW.**

The 100<sup>th</sup> Electric Locomotive of the year 2013-2014 of Chittaranjan Locomotive Works, bearing no.312410 ( WAG-9H) was inaugurated and dedicated to the service of the Nation on 14-08-2013 by Sri Radhey Shyam, General Manager, CLW in a simple ceremony held inside the workshop. It is worth mentioning here that CLW produced 100 electric locomotives in this year in comparison to the 83 electric locomotives produced during the corresponding period of last year.

### **1.26 VISIT OF MEMBER ELECTRICAL , RAILWAY BOARD TO CLW**

Shri Kul Bhushan, Member Electrical, Railway Board & Ex-Officio Secretary to Govt. of India visited Chittaranjan Locomotive Works (CLW) on 9<sup>th</sup> Sept 2013 . During his visit to the workshop, Multi operation high speed 3 - phase passenger locomotives of WAP-5 type bearing loco no. 30069 & 30070 were ceremonially flagged off by Shri Kul Bhushan , Member Electrical & Shri Radhey Shyam , GM, CLW for inclusion in the fleet of Indian Railways .

Shri Kul Bhushan also inaugurated a Newly built Shed in Test shop under AP-275 project at a cost of Rs 3.47 crores to accommodate more locomotives and a CNC Universal Machining Centre inside Heavy Machine Shop for complete machining of 3-phase stators at a cost of Rs 10 crores .

### **1.27 Cultural Festival “ AAROHAN 2013 “ In Chittaranjan**

A Cultural Festival named “AAROHAN 2013” was organized by the Chittaranjan Locomotive Works Cultural Association ( CLWCA) on 4<sup>th</sup> & 5<sup>th</sup> Nov 2013 at Rabindra Manch premises ..

### **1.28 4<sup>th</sup> All India Railway Archery Championship 2013-14 in CLW.**

The 4<sup>th</sup> All India Railway Archery Championship 2013-14 was held at the Oval Ground on 18<sup>th</sup> December 2013. Shri Gurdev Singh, Financial Adviser and President, CLWSA inaugurated the meet as Chief Guest. This Championship lasted till 20<sup>th</sup> December comprising of Events of both Men & Women categories. The participating teams includes DMW/Patiala, S.C.Railways, N.F.Railways, E.Railways, S.E.C.Railways and CLW/Chittaranjan being the host team. The Championship was organized in six categories namely; Recurve Men, Recurve Women, Compound Men, Compound Women, Recurve Men Individual and Recurve Women Individual.

2

## SALIENT FEATURES

## 2. SALIENT FEATURES

Salient features of CLW w.r.t the following :

### 2.1 Total turn over as on 31.12.13

- a) For Indian Railways : Rs.2303.86 Crores  
b) For others : --

Turn over ratio as on 31.12.13 – (-)17%

### Break up of Turnover as on 31.12.13

Supply of Locos including TOT	Rs. 2051.34 Crores
Components manufactured for stock	Rs. 241.44 Crores
Supply of Spares for Zonal Railways	Rs. 11.08 Crores

í í í í í í í

TOTAL Rs: 2303.86 Crores

Turn over ratio of Store Deptt./CLW for 2012-13 upto Dec013 : 55.56%

### 2.4 Total assets : (as on 31.12.13 ) : Rs. 725.90 crores

- e. **Fixed assets: (as on 31.12.13 )** : Rs. 318.68 crores  
E) Township : Rs.27.37 crores  
F) Workshop with M&P : Rs. 291.31 crores  
f. **Floating assets (as on 31.12.13 )** : Rs. 407.22 crores  
G) Stores : Rs. 843.16 crores  
H) WMS : Rs. (-) 454.45 crores  
I) Misc Adv. : Rs. 18.51 crores

### 2.3 Sanctioned and on-roll position of staff as on (01.01.2014) group of staff wise i.e Group A, Group B, Group C & Group D.

Group	Sanctioned Strength	On Roll
Group A	240	104
Group B		79
Group C	11835	9469
Group D	3144	2807

2.12 Elec. Power requirement (average maximum demand) : 11MVA

2.13 Electric energy consumption : (in lakh units/year) : 456.70194 Lakh unit (from 1<sup>st</sup>

2.14 January,2013to 31<sup>st</sup> December 2013.

2.15 No. of H.T. Sub station: A) 33/11 KV :01 no.

B) 11/3.3KV : 01no.

C) 11/0.4KV : 45 nos.

D) 11/0.4KV : 21 nos.- under main shop.

2.16 Stand by power generation capacity(in KW) : 8037.50 KWH(as on 31.12.2013)

2.8 Water consumption (in lakh litres/Day) : 150 Lakhs/lit./Day

2.9 Workshop Land(In hectares) : 100.44 Hectares.

2.10 Township area : 1834.441 Hectares.

2.11 (a) Covered area in shops (in SQM) : 239843 SQM

(b)Covered area of other service building (in SQM) : 35241 SQM

2.12 (a)Total staff as on 31.12.13 : 12276 Nos.

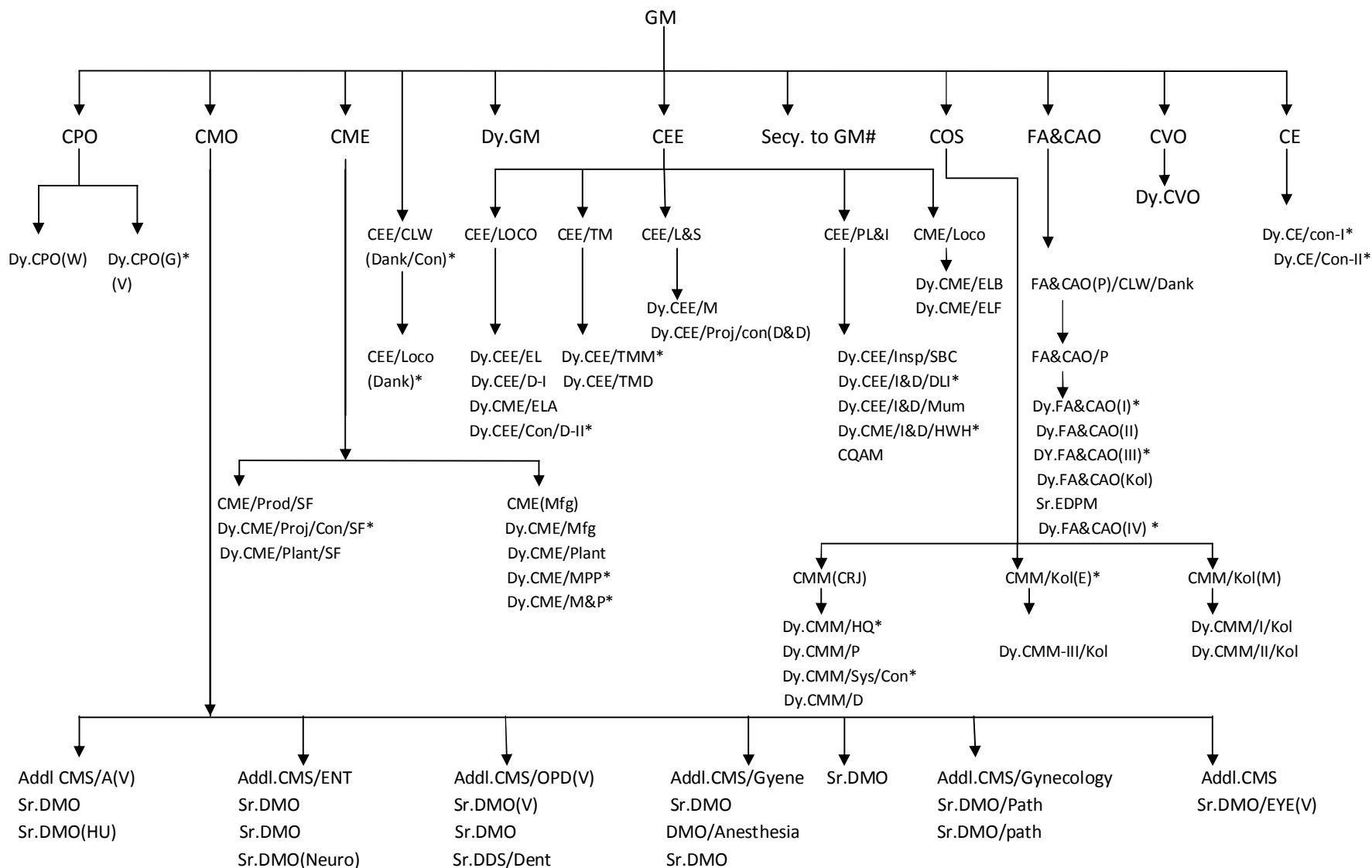
(b)Total number of staff quarters : 9346 Nos.

2.13 Hospital (no. of beds) : 197 Nos.

3

# ORGANISATIONAL CHART

# ORGANISATIONAL CHART (UPTO JAG) AS ON 01.01.14 .



Note: - # (Elect. Cadre) \* (W/C) V- Vacant.

4

# **PRODUCTION PERFORMANCE**

## 4. PRODUCTION PERFORMANCE :

CLW built 2351 Nos. of Steam Locomotives and 842 Nos. of Diesel locomotives before switching over completely to the production of Electric Locomotives. The last Steam Locomotive was built in the year 1971-72. The production of Diesel locomotives continued up-to 31<sup>st</sup> March 1993 when the last ZDM-5 Narrow Gauge Loco was turned out. Now CLW is involved in the production of Electric Locomotives (Conventional and Three phases) and has produced 5132 Electric locomotives till 31<sup>st</sup> Decø2013and maintenance spares required by Zonal Railways. The annual out-turn of various types of Locomotives CLW has produced since inception is given in the Annexure-V in two sheets.

### 4.1 **ELECTRIC LOCOMOTIVES :**

The production of Electric Locomotives was started in the year 1961. Till 31<sup>st</sup> Decø 2013, 5132 nos Electric Locomotives of various classes and traction have been produced as shown in the Annexure-III in two sheets.

The present production of electric locomotives consists of:

- xi. 5000 HP 6-axle freight Loco (WAG-7) with fabricated bogies (High Adhesion) and secondary suspension with axle load of 20.5 Ton suitable for air brake trailing stock
- xii. 5000 HP, 6 Axle AC Passenger Traffic Locomotives (WAP-4) fitted with Flexi-coil cast steel bogies and Axle load of 18.8 Ton hauling Rajdhani Express and other Super Fast trains.
- xiii. 3-phase AC Thyristor controlled 6000 HP, 6 Axle freight WAG-9 H (with an Axle load of 22.5 Ton).
- xiv. Passenger version of 3-phase loco viz. WAP-5 with an axle load of 19.5 ton having Micro processor controlled Brake system for hauling Mail/Express and other Super fast trains.
- xv. Passenger version of 3-phase Loco viz. WAP-7 with an axle load of 20.5ton having Microprocessor controlled Brake system suitable for hauling Mail/Express and other super fast trains.

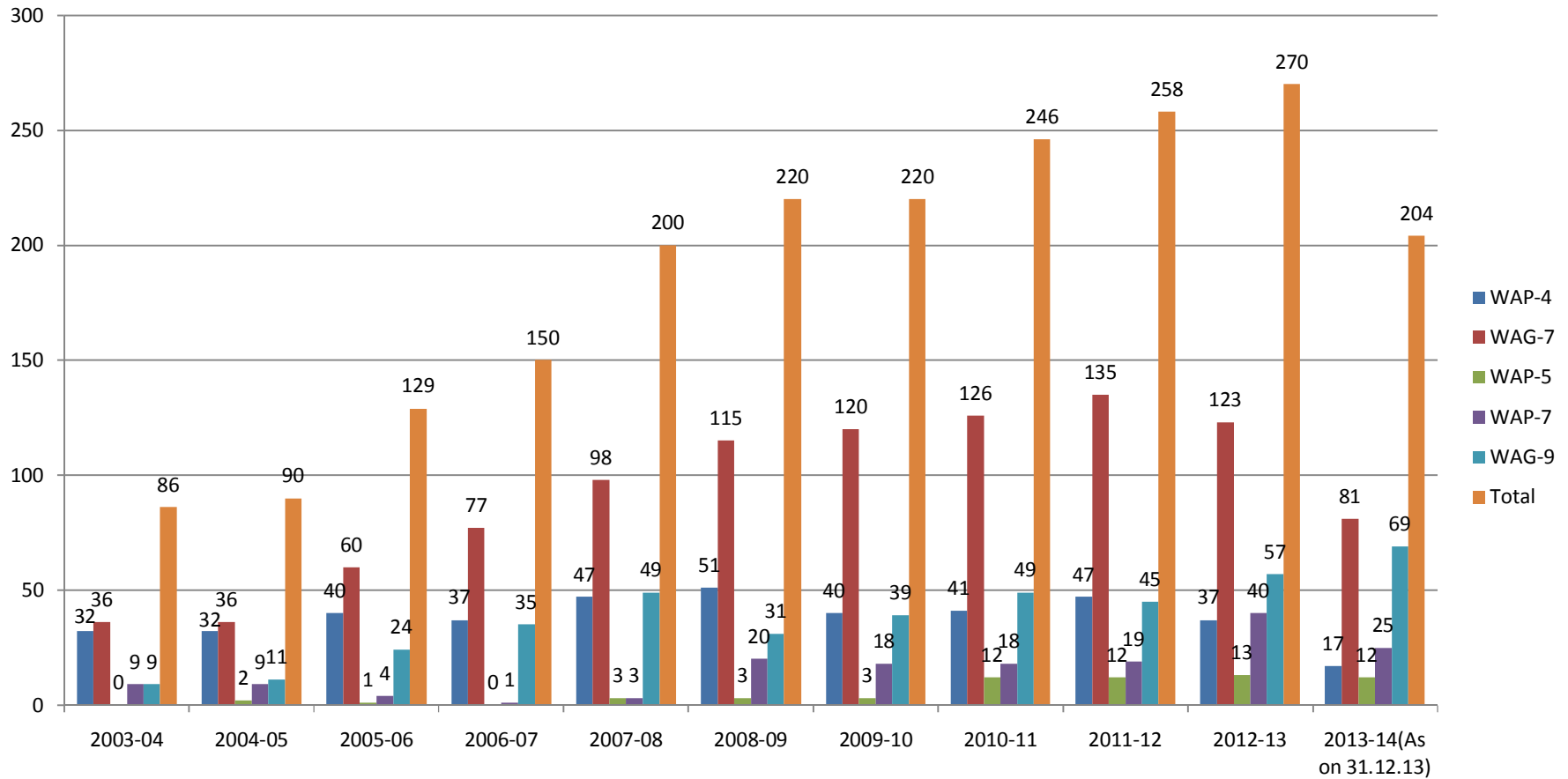
During the year 2012-13 CLW has manufactured 37 nos. WAP-4, 123 nos.WAG- 7, 57 nos.WAG-9, 13nos.WAP-5 and 40 nos. WAP-7 Electric Locomotives i.e. total 270nos. Locomotives against planned yearly out turn of 273 Electric Locomotives (As per JPO-59, dt. 09.01.2013). CLW has planned to produce 275 nos Electric Locomotives during the year 2013-14 & 280 nos Electric Locomotives during the year 2014-15(As per JPO-63, dt.1.2.14).



4.1.1 Year wise production from 2000-01 to 2013-14 vis-à-vis production programme as said by the Railway Board are as under:

<b>YEAR</b>		<b>WAP-4 (RAJ)</b>	<b>WAG-7 (HH)</b>	<b>WAP - 5 (TP)</b>	<b>WAP-7 (TPP)</b>	<b>WAG-9 (TG)</b>	<b>Total</b>
2000-01	Target	45	67	2	1	5	120
	Actual	50	62	2	1	5	120
2001-02	Target	37	50	-	1	2	90
	Actual	34	40	-	2	6	82
2002-03	Target	20	24	4	9	12	69
	Actual	28	27	1	6	7	69
2003-04	Target	32	39	-	9	6	86
	Actual	32	36	-	9	9	86
2004-05	Target	30	35	-	13	12	90
	Actual	32	36	2	9	11	90
2005-06	Target	39	56	4	2	27	128
	Actual	40	60	1	4	24	129
2006-07	Target	37	77	1	-	35	150
	Actual	37	77	-	1	35	150
2007-08	Target	47	98	3	3	49	200
	Actual	47	98	3	3	49	200
2008-09	Target	51	115	4	20	30	220
	Actual	51	115	3	20	31	220
2009-10	Target	40	120	5	20	45	230
	Actual	40	120	3	18	39	220
2010-11	Target	35	95	15	30	55	230
	Actual	41	126	12	18	49	246
2011-12	Target	30	100	15	30	55	230
	Actual	47	135	12	19	45	258
2012-13	Target	20	100	15	40	75	250
	Actual	37	123	13	40	57	270
2013-14 As per JPO-61, dt. 16.7.13(As on 31.12.13)	Target	20	92	15	50	98	275
	Actual	17	81	12	25	69	204

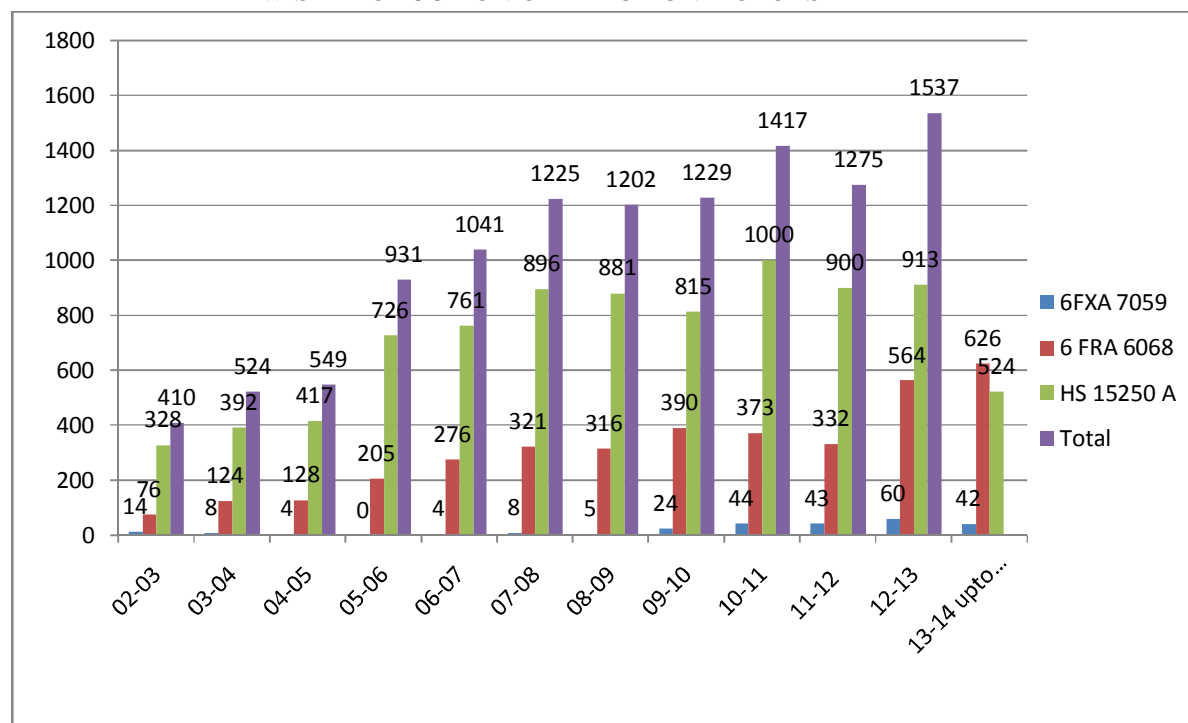
Year wise Electric Loco production from 2003-04 to 2013-14(As on 31.12.13)



## 4.2 TRACTION MOTORS:

4.6.1 Cumulative production of Traction Motors during the year 2013-14 upto 31.12.13 has been 1192 Traction Motors (524 Hitachi & 668 Three Phase). Yearwise production of Traction Motors is given at Annexure-II.

YEARWISE PRODUCTION OF TRACTION MOTORS



### 4.2.2 STATIC EQUIPMENT:

Static equipment are required for manufacture of conventional locomotives (WAG 7/ WAP4)

The production of Static Equipment during 2013-14 was 80 loco sets + Rly. Spare demands.

Details of various items of Static Equipment (Quantity in number) manufactured during the year 2013-14 up to 31.12.13 is shown below:

Item Description	Qty. (No.)	Item Description	Qty. (No.)
Motor Contactor (MC)	306	Traction Braking Switch (CTF-1,2&3)	114
Shunting Contactor (SC)	872	Master Controller (MP)	89
Electro Magnetic Contactor (EMC)	270	Smoothing Reactor (SL)	96
Braking Excitation Contactor (C145)	51	Inductive Shunt (SJ)	157
Reverser (J)	79		

Year wise production of various static equipments from 1972-73 onwards are given in Annexure III

#### 4.2.3 SUPPLY OF SPARES :

The following materials were supplied to zonal Railways as spares during the year 2012-13 up to 31.12.13 against their sanctioned RSPS/vetted indents.

Item Description	Qty. (No.)	Item Description	Qty. (No.)
Hitachi Traction Motor	108	3 Phase Traction Motor (Co Co)	16
3phase Rotor SCH-I (Co-Co)	02	Smoothing Reactor (SL)	6
3phase Rotor SCH-II(Co -Co)	11	Hitachi Armature shaft	25

#### 4.2.4 IMPROVEMENTS TO ENHANCE RELIABILITY:

To improve reliability and performance, modifications as listed below have been implemented during 2013-14 up to 31.12.13.

##### 4.2.4.1. THREE PHASE TRACTION MOTOR TYPE 6FRA 6068 :

- To arrest the failure of Bearing seizure, looseness of Inner bearing labyrinth (stopper) inside End frame (DE & NDE), the interferences between components has been revised vide RDSO Modification sheet No.RDSO/2012/EL/MS/0415(Rev.0) dated 30.10.12. All drawings of the relevant components have been modified and implemented accordingly.
- To arrest the failure of speed sensor, in-house test facility of speed sensor with installation of CRO arrangement has been implemented.
- For redundancy, specification of speed sensor has been modified incorporating completely another independent channel such that incase of any failure in one channel, other channel will remain active.
- Grease escape hole in End frame (NDE) of phase TM type 6FXA 7059 has been incorporated in drawing and referred to RDSO for approval.
- Specification of temperature sensor has been revised so as to get complete integrated unit from trade avoiding soldering defects.

##### 4.2.4.2 HITACHI TRACTION MOTOR TYPE HS-15250A :

- To reduce the amount of counter weight in balancing the Armatures, dynamic balancing of Armature stack (before winding) with commutator and correction thereafter has been started.
- To maintain the specified depth(2 to 2.5mm) of mica undercutting of commutator, the process of diamond turning before mica undercutting has been started.

##### 4.2.4.3 INNOVATIONS & DEVELOPMENTAL WORK IN T.M . SHOPS :

- During 2013-14, CLW has switched over to scheme 6 I/II rotar manufacturing from V2 design.

#### 4.7 Production Performance of Manufacturing Shops

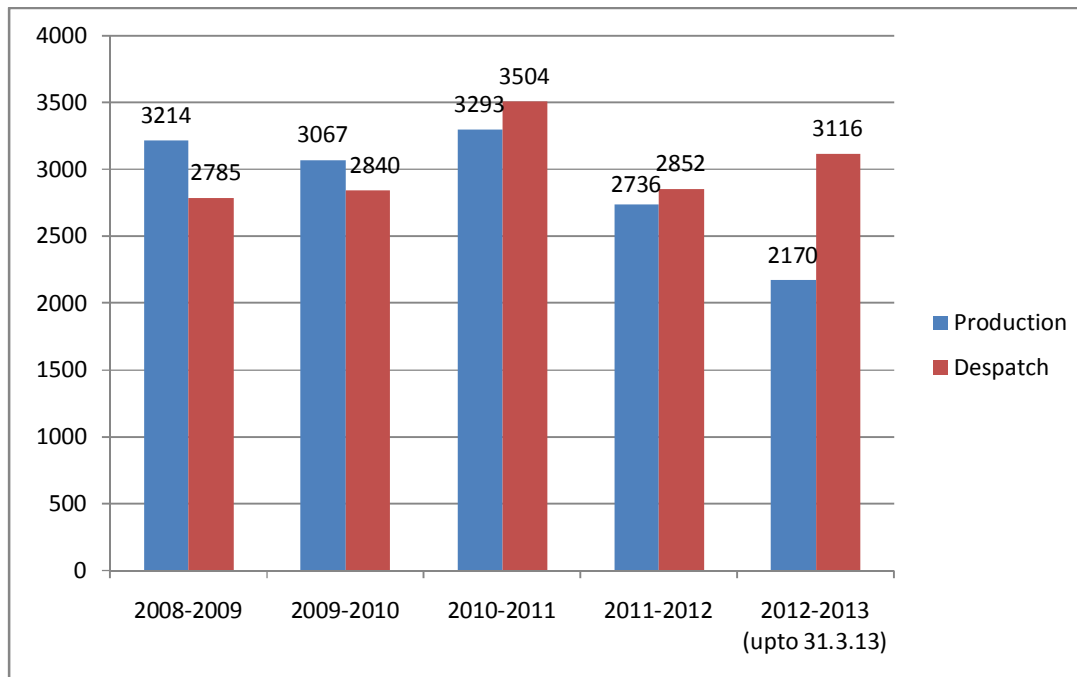
4.8

Sl No.	Name of items	2011-12	2012-13	2012-13 (up to Dec02)	2013-14 (up to Dec03)	Comparison of production of 2013-14 with 2012-13 Excess(+), Less(-)
1.	Wheel set assembly	275 L/S	291 L/S	213 L/S	202 L/S	+11 L/S(non availability of WAG-9 /WAP-7 wheel disc and main gear of WAP-5)
2.	Hitachi Susp. Tube	552Nos.	537 Nos	426 Nos	206 Nos	- 220 nos.( Conventional loco target reduced by 22 L/s and material received from Trade)
3.	Hitachi Magnet	189 Nos	190 Nos	136 Nos	123 Nos	-13nos. (Non-availability of Steel

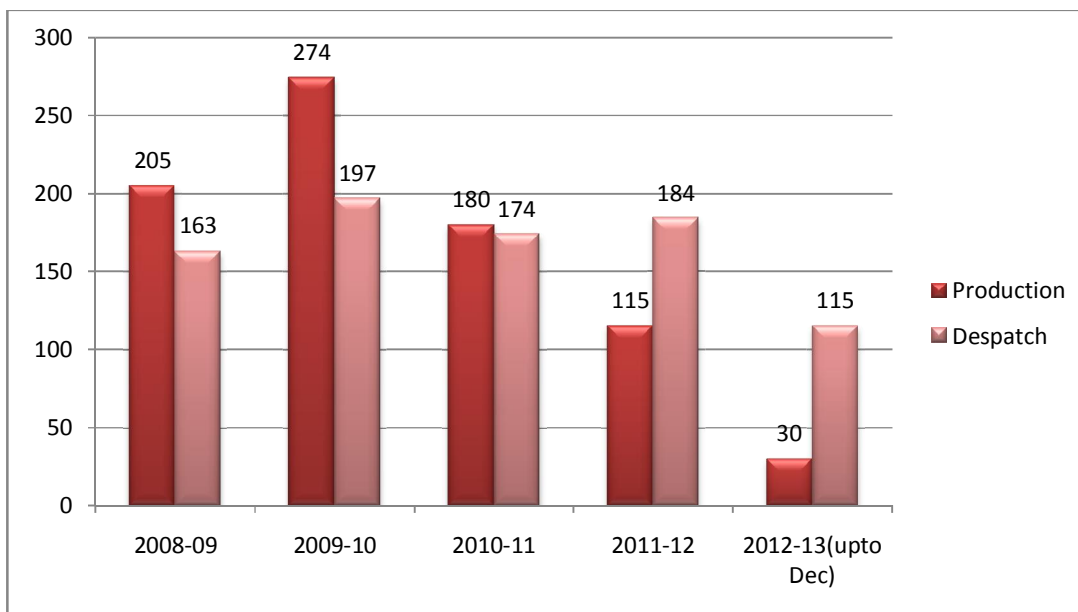
	Frame					components of Magnet Frame Kit)
4.	Stator 3 phase	394Nos.	394 Nos	288 Nos	333 Nos	+45 nos.
5.	Equaliser	139 L/S	120 L/S	93 L/S	82 L/S	-11 L/S (Conventional loco target reduced by 22 L/S))
6.	Compensating Beam	141 L/S	120 L/S	94 L/S	82 L/S	-11 L/S (Conventional loco target reduced by 22 L/S))
7.	WAG9 Head Stock	39 L/S	47 L/S	31 L/S	42 L/S	+11 L/S

#### 4.4 Production Performance of Steel Foundry :

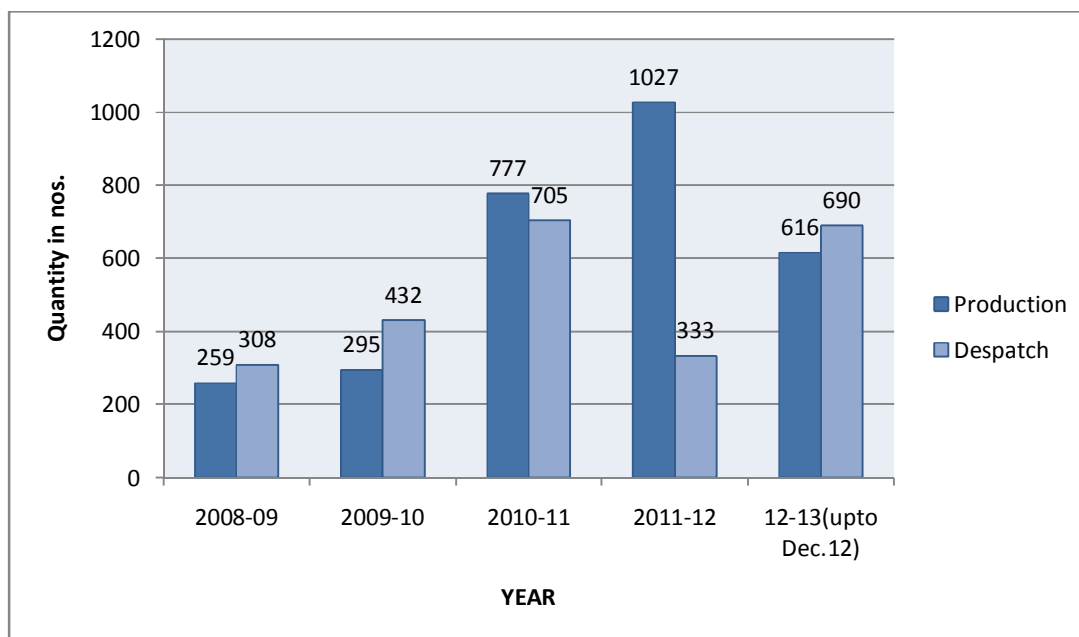
##### 4.4.1 Production and Despatch of Steel Castings over last five years—



**4.4.2 Production and Despatch of Loco Bogies over last five years**



**4.6 Production & Desp. of Casnub Bogie Castings over last five years**



## Annexure – I

## YEARLY OUTTURN OF ELECTRIC LOCOMOTIVES FROM CLW

Year	WC M-5	DC WC G-2	AC MT WA G-1 WA G-4	ACMT (WK) WAM -4B	WAG -5A	ACMT WAP -1,3,4	ACMT WCA M-4	WAG -7	DC WC M-6 WC G-3	ACMT WAM -4	WAG -9	WAP -5	WAP -7	Grand Total
1961-62	05													5
1962-63	14													14
1963-64	2		2											4
1964-65			27											27
1965-66			32											32
1966-67			57											57
1967-68			50											50
1968-69			28											28
1969-70			31											31
1970-71		3	41							06				50
1971-72		6								40				46
1972-73		14								41				55
1973-74		14								36				50
1974-75		13					1			32				46
1975-76		4					4			46				54
1976-77		3					13			28				44
1977-78							18			41				59
1978-79				5			11			40				56
1979-80				2			6			43				51
1980-81				11		4				54				69
1981-82				17						33				50
1982-83				2						51				53
1983-84				17	21					9				47
1984-85					49	1								50
1985-86					54									54
1986-87					70	1								71
1987-88					65	1								66
1988-89					98	2								100
1989-90					100	5								105
1990-91					102	8								110
1991-92					104	10		1						115
1992-93					108	12		5						125
1993-94					105	15		20						140
1994-95					105	15		30						150
1995-96					61	14		59	1					135
1996-97					25	18		111	1					155
1997-98						28		137						165
1998-99						45		112			8			165
1999-00						60		50			8	1	1	120
2000-01						50		62			5	2	1	120

2001-02						34		40			6	-	2	82
2002-03						28		27			7	1	6	69
2003-04						32		36			9	-	9	86
2004-05						32		36			11	2	9	90
2005-06						40		60			24	1	4	129
2006-07						37		77			35	-	1	150
2007-08						42		98			49	3	3	200
2008-09						51		115			31	3	20	220
2009-10						40		120			39	3	18	220
2010-11						40		120			40	12	18	230
2011-12						47		135			45	12	19	258
2012-13						37		123			57	13	40	270
2013-14 (upto 31.12.13)						17		81			69	12	25	204
<b>TOTAL</b>	<b>21</b>	<b>57</b>	<b>268</b>	<b>54</b>	<b>1067</b>	<b>771</b>	<b>53</b>	<b>1655</b>	<b>02</b>	<b>500</b>	<b>443</b>	<b>65</b>	<b>176</b>	<b>5132</b>
<b>Summary as on 31.12.13</b>						<b>Steam locos – 2351 nos.</b> <b>Diesel locos – 842 nos.</b> <b>Electric locos – 5132 nos.</b> <b>Total - 8325nos.</b>								



**Annexure - II**

**ANNUAL PRODUCTION OF TRACTION MOTORS AT CLW**

Year	MG-1580	TAO-659	HS15250A	6FRA6068	6FXA7059	TOTAL
1969-70	92	-	-	-	-	92
1970-71	92	-	-	-	-	92
1971-72	18	129	-	-	-	147
1972-73	-	75	-	-	-	75
1973-74	-	195	-	-	-	195
1974-75	-	255	-	-	-	255
1975-76	4	349	-	-	-	353
1976-77	12	233	-	-	-	245
1977-78	12	425	-	-	-	437
1978-79	8	425	-	-	-	433
1979-80	8	385	-	-	-	393
1980-81	10	432	-	-	-	442
1981-82	5	430	-	-	-	435
1982-83	8	420	-	-	-	428
1983-84	4	361	-	-	-	365
1984-85	1	305	-	-	-	306
1985-86	3	325	-	-	-	328
1986-87	12	440	-	-	-	452
1987-88	6	380	-	-	-	386
1988-89	8	350	79	-	-	437
1989-90	14	350	-	-	-	364
1990-91	9	450	21	-	-	480
1991-92	5	500	80	-	-	585
1992-93	6	500	95	-	-	601
1993-94	2	400	250	-	-	652
1994-95	-	220	422	-	-	642
1995-96	-	92	630	-	-	722
1996-97	-	36	701	-	-	737
1997-98	-	4	750	-	-	754
1998-99	-	-	755	6	-	761
1999-00	-	-	600	6	4	610
2000-01	-	-	528	30	-	558
2001-02	-	-	400	36	4	440
2002-03	-	-	320	76	14	410
2003-04	-	-	392	124	8	524
2004-05	-	-	417	128	4	549
2005-06	-	-	726	205	-	931
2006-07	-	-	761	276	4	1041
2007-08	-	-	896	321	8	1225
2008-09	-	-	881	316	5	1202
2009-10	-	-	815	390	24	1229
2010-11	-	-	1000	373	44	1417
2011-12	-	-	900	332	43	1275
2012-13	-	-	913	564	60	1537
2013-14 (upto 31. 12. 13)	-	-	524	626	42	1192
<b>Total</b>	<b>339</b>	<b>8466</b>	<b>13856</b>	<b>3809</b>	<b>264</b>	<b>26734</b>

## Annexure - III

## ANNUAL PRODUCTION OF STATIC EQUIPMENTS AT CLW

YEAR	Motor Contactor (MC)	Shunting Contactor (SC)	Electric Magnetic Contactor (EMC)	Breaking Excitation Contactor (C145)	Reverser (J)	Traction Breaking Switch (CTF1,2 & 3)	Master Controller (MP)	Inductive Shunt (SJ)	Smoothing Reactor (SL)
1972-73	125	864	592	--	123	--	121	129	46
1973-74	185	754	495	--	102	--	94	171	73
1974-75	135	624	449	--	120	--	104	103	49
1975-76	257	812	576	--	104	--	123	147	70
1976-77	243	816	560	005	101	015	118	183	64
1977-78	348	637	664	023	113	031	147	234	74
1978-79	349	692	628	023	100	019	134	210	75
1979-80	330	838	667	009	092	022	126	231	66
1980-81	412	843	729	001	112	041	146	219	52
1981-82	514	784	709	065	126	124	157	209	90
1982-83	630	885	606	049	118	154	149	175	92
1983-84	776	548	696	112	100	165	140	066	100
1984-85	646	268	740	136	129	191	133	050	80
1985-86	686	480	860	076	125	213	155	039	104
1986-87	598	608	960	062	137	213	167	019	140
1987-88	604	416	1016	075	154	220	168	012	170
1988-89	602	616	830	101	336	167	203	150	210
1989-90	662	1200	920	110	238	282	230	215	220
1990-91	700	1800	960	120	240	345	240	310	240
1991-92	740	2360	1075	105	250	360	250	340	242
1992-93	750	2400	1124	100	295	405	290	390	250
1993-94	906	2718	1216	133	337	409	300	400	280
1994-95	972	2945	1162	157	324	450	320	480	300
1995-96	948	2630	1057	138	316	384	300	404	254
1996-97	868	2752	976	130	276	378	292	450	308
1997-98	980	2268	1105	157	339	439	342	495	340
1998-99	982	3577	983	128	350	453	343	500	321
1999-00	853	2672	932	139	291	339	285	390	260
2000-01	728	2469	952	129	328	408	237	268	224
2001-02	698	1565	549	122	277	390	200	280	210
2002-03	490	1244	740	80	158	340	165	154	164
2003-04	580	1796	1089	171	249	246	200	212	151
2004-05	534	1770	696	141	183	286	178	213	124
2005-06	708	2430	1066	181	256	450	232	322	206
2006-07	810	2500	965	200	268	446	270	375	239
2007-08	1020	2800	1020	222	324	416	275	457	304
2008-09	933	2588	1044	158	272	482	338	362	196
2009-10	480	1560	520	80	160	240	160	232	149
2010-11	480	1560	520	80	160	240	180	271	124
2011-12	480	1560	430	80	156	210	180	259	145
2012-13	480	1560	430	80	140	210	210	231	139
2013-14 (up to 31.12.13)	306	872	270	51	79	114	89	157	96
Total	25528	65081	33578	3929	8458	10297	8491	10514	7041

5

DESIGN & DEVELOPMENT  
INCLUDING TOT

## 5. CENTRE FOR DESIGN & DEVELOPMENT:

### 5.3 Setting of Centre of Excellence at CLW for Design and Development of New Technology Equipment for Electric Rolling Stock

The purpose of establishing the Centre of Excellence is to develop capability for designing, development and evaluation of advanced technology systems for Electric Rolling Stock. Consultancy work has been awarded to M/s E.C. Engineering/Poland

#### Status:-

All specifications have been approved by Rly. Brd. NSR for item nos. 1, 2, 3, 4 and 5 under finance vetting since 16.10.2012. Finance vetting is still awaited.

### 5.4 Development of IGBT Technology based Power Converter for 3-phase Locomotives

The present Power Converter is based on GTO technology which is slowly getting outdated by improved IGBT technology. So far, a total order of 138 L/sets of IGBT based power converters have been placed on different firms (M/s. BHEL . 57 L/sets, CGL . 03 L/sets, BTIL . 15 L/sets & ABB . 63 L/set).

#### Status:-

**BTIL:** First loco with IGBT based Traction Converter commissioned in loco 31234 and turned out from CLW on 18.12.09. Homed at ELS/GMO in DHN division. Presently 14 locomotives with BT supplied IGBT based traction converters are running.

**BHEL:** First loco with IGBT based Traction Converter commissioned in loco 31248 and turned out from CLW on 04.10.10 homed at ELS/LGD in SC division.

Presently 24 locomotives with BHEL supplied IGBT based traction converters are running.

**CGL:** One set commissioned in loco No. 31412 and dispatched in Sept 03. Slip Slide test of locomotive is in progress at ELS/GMO. Supply of remaining sets to commence after the trial run of the prototype set.

**ABB:** First loco with IGBT based Traction Converter commissioned in loco 31281 and turned out from CLW on 31.01.11 homed at ELS/AQ in NGP division. Presently 19 locomotives with ABB supplied IGBT based traction converters are running.

### 5.5 Development of IGBT Technology based Auxiliary Converter for 3-phase Locomotives

The Auxiliary Converter presently being used are also GTO technology based which is getting obsolete. In order to adopt the latest IGBT technology, this project has been undertaken. So far, a total order of 132 L/sets of IGBT based Auxiliary converters have been placed on different firms (M/s. BHEL . 46 L/sets, CGL . 41 L/sets, BTIL . 15 L/sets HIRECT -10 & ABB . 20 L/set).

#### Status:-

**BHEL:** First loco with IGBT based Auxiliary Converter commissioned in loco 31248 and turned out from CLW on 04.10.10 homed at ELS/LGD in SC division. Presently 24 locomotives with BHEL supplied IGBT based Auxiliary converters are running.

**AAL:** Loco No. 31415 (WAG-9H) dispatched to ELS/TKD on 01.08.2013. Performance under watch. Supply of remaining sets to commence after the trial run of the prototype set.

**HIRECT:** Prototype unit received at CLW. Firm to commission in locomotive.

**CGL:** Installed in Loco No. 30325. Loco dispatched to ELS/LGD in SC division on 29.10.2012. Presently 13 locomotives with CGL supplied IGBT based Auxiliary converters are running.

**ABB:** Converter commissioned in loco 31351 (WAG-9H) & was turned out from CLW on 31.08.12. Presently 08 locomotives with ABB supplied IGBT based Auxiliary converters are running.

### 5.4 Development of Open Platform Control System for Vehicle Control with TCN compatibility

#### e. Hardware:

The control system used in three-phase loco is MICAS-S2, which is proprietary of BT. CLW has taken up a project to develop control system hardware and software based on published IEC standards viz. IEC-61375 TCN. Tender Case No. 70/2004/1109 has been opened and P.O. placed on M/s. BHEL for 3 sets & M/s. Stesalit for 02 sets.

**Status:-**

**BHEL:** 1st loco set commissioned in Loco No. 31295 (WAG-9) LGD since Oct. 2011. The loco is running under ELS LGD since Oct. 2011. Remaining 02 sets commissioned on loco Nos. 31367 & 31399.

**Stesalit:** Material received at CLW on 07.11.2013. Firm to submit technical details about development of application software.

**f. Software:**

Authoring of Vehicle Control Software for TCN/IEC-61375 Compliant Hardware for 3-Phase Locomotives awarded on M/s. ARC, Bangalore.

**Status:**

Software in 1st loco set downloaded in Loco No. 31295. The loco is running under ELS/LGD since Oct. 2011. Remaining 02 sets commissioned on loco Nos. 31367 & 31399.

**5.5. Indigenous development of TCN compliant vehicle control system through C-DAC.**

This project has been undertaken through C-DAC for development of TCN compatible vehicle control system which will ensure compatibility between open standard equipments of different makes. MoU is for developing 02 sets of TCN compliant vehicle control system.

**Status:**

Commissioning has been completed in loco No. 31356 (WAG-9H). Loco dispatched to ELS/TKD. Performance under watch.

C-DAC has requested for additional funds for the project vide letter dated 29.10.2012.

Revised estimate prepared and under finance concurrence.

A meeting was held at C-DAC/TVC on 06th & 7th Jan 2014 to discuss modalities for transfer of ToT from C-DAC to prospective suppliers.

**5.6. Development of modular and Universal Aux. Converter for Locos & EMUs with C-DAC**

This project shall result in development of a modular universal auxiliary converter for railway rolling stock so that the same electrics can be used in 3-phase loco, tap changer loco and EMUs. C-DAC/TVC is executing the project. MoU is for developing 07 prototypes of 130 kVA of modular and Universal Aux. Converter for Locos & EMUs.

**Status:**

Prototype has been received at CLW. Full load test completed in loco no. 31356 (WAG-9H). Test results evaluated by C-DAC. Box2 to be supplied to CLW.

C-DAC has requested for additional funds for the project vide letter dated: 25.10.2013.

Revised estimate prepared and under finance concurrence.

**5.7. Development of Wireless remote control for control of slave locomotives on a train.**

This project has been taken up as per RSP provision. The project shall help develop wireless communication amongst locomotives in a train formation leading to better adhesion and other operational advantages. 2 sets of this system have been ordered on M/s ARC Bangalore for 3-phase locomotives.

**Status:**

The prototype has been installed in loco nos. 31282 (WAG-9) & 31284 (WAG-9). Loco has been put into commercial service w.e.f. 18.05.2012.

2<sup>nd</sup> set received on 18.12.13. Loco to be nominated.

**Case for 75 locosets:** Tender opened on 29.05.2013. Case under TC.

**5.8. Development of wireless MU coupler system for AC tap changer locos.**

**Status:**

PO issued for 01 set each on M/s Medha and M/s Lotus Wireless

**M/s Lotus Wireless:** The equipment has been commissioned in July, 2012 in loco No. 28480 (WAG-7) & 28481 (WAG-7) and dispatched to ELS/KZJ.

**M/s Medha:** Provisional design clearance given by RDSO in Jan 2012. Brake interface under evaluation at RDSO.

**5.9. Development of Active Speed sensor with Doppler radar on 3-phase locos.**

This project is for improving slip slide control of 3-phase locomotive of Zonal Railways and appears in RSP. An order of 80 locosets placed on M/s ARC/Bangalore. Firm requested for extension of qty by further 62 sets.

**Status:**

All 80 sets have been installed in different sheds. (GMO-30, AQ-30 & LGD-20).

**5.10. Development of Hotel load Converter**

This is for utilizing OHE power for supply of hotel load of coaches through HOG Scheme by providing Hotel Load converter in the locomotive. Order placed on M/s AAL - 03 sets, Siemens - 03 set, BHEL . 04 set ABB-4 set and Medha- (01+07) sets.

**Status:**

**Siemens:** Hotel load converter fitted in 30277 (WAP-7) and dispatched to GZB on 30.06.2010. Commercial service of the loco started on 21.02.2011.

2<sup>nd</sup> set installed in loco No. 30365 (WAP-7) dispatched to ELS/GZB on 31.10.2013.

**BHEL :** Firm has not given time schedule for type test. RDSO is following the matter further.

**AAL:** Firm has revised dimensions of hotel load converter box. The same has been checked in the locomotive in presence of RDSO on 19.10.2013. RDSO has been advised to give necessary design clearance.

**ABB:** Prototype inspection to be held from 4<sup>th</sup> February 2014.

**MEDHA:** Loco No. 30375 (WAP-7) dispatched to ELS/GZB.

**5.11. Development of Alternate Drive Gear Assembly for WAP5 AC Electric Locos (160 Kmph).**

This project will address the reliability issues of the presently used hurth coupling by way of improved design of the transmission system. Procurement of 5 loco sets (20 Nos.) of new type of Drive Gear system as per RDSO specification.

**Status:**

- One locoset commissioned in Loco No. 30056 (WAP-5). Loco sent to ELS/Vadodara.
- RDSO to issue field trial clearance.

**5.12. Development of Alternate Drive Gear Assembly for WAP5 AC Electric Locos (200 Kmph).**

This project will address the reliability issues of the presently used hurth coupling by way of improved design of the transmission system. Procurement of 2 loco sets (08 Nos.) of new type of Drive Gear system as per RDSO specification.

**Status:**

Provisional I/C issued. Material expected in Feb 14. Installation to start after receipt of material.

**5.13. New Driver Display (100 nos.)**

The project has following rationale:

- 10.4+VGA Graphical Colour Display (TFT)

- Provides a number of graphic screens for process data visualization
- Trouble Shooting Directory.
- Aesthetically beautiful appearance.

**Status:**

**ARC:** All units have been installed by July 12. Performance from Rlys. has been collected and it has been made a regular item.

**Jayashree Engg. Works:** Test for communication performed by the firm at C-D&D in April 12. Firm has submitted internal test report on 31.10.13.

D.P. has expired. Firm to submit valid D.P. extension.

**N & S Solutions:** Test protocol of the firm has been approved on 25.12.2013. Firm has been asked to submit internal test reports and offer for prototype tests.

#### 5.14. Composite converter

Indian Railways has planned to migrate to IGBT based technology for its 3-phase WAP5 locomotives. Implementation of HoG scheme in WAP-5 loco is an issue because of the smaller size of the locomotive. Considering smaller size of the IGBT based traction converter vis-à-vis GTO based, IR has planned to implement the composite converter housing both traction and hotel load converter in the same cubicle in WAP-5 locomotives.

**Status:**

Tender opened on 09.11.2012. Case discharged. The revised specification under preparation in consultation with manufacturers and RDSO.

#### 5.15. Indigenous development of propulsion system

IGBT based 3-phase propulsion system consists of traction converter, auxiliary converter, and control electronics (Vehicle control unit).

An order of 15 loco sets placed on BHEL. Quantity was to be enhanced by 15 sets by operating special option clause as per Rly. Board's Contract. Railway Board has not agreed to enhance quantity by 15 sets.

An order of 05 loco sets placed on MEDHA.

**Status:**

**BHEL:** 1st loco set on Loco no. 31347 (WAG-9) dispatched to ELS/LGD on 11.7.2012.

14 more locomotives have been commissioned.

**MEDHA:** Loco No. 31427 (WAP-7) dispatched to ELS/LGD on 31.10.2013. Balance supply after clearance of field trial by RDSO.

### INNOVATIONS & DEVELOPMENTAL WORK :

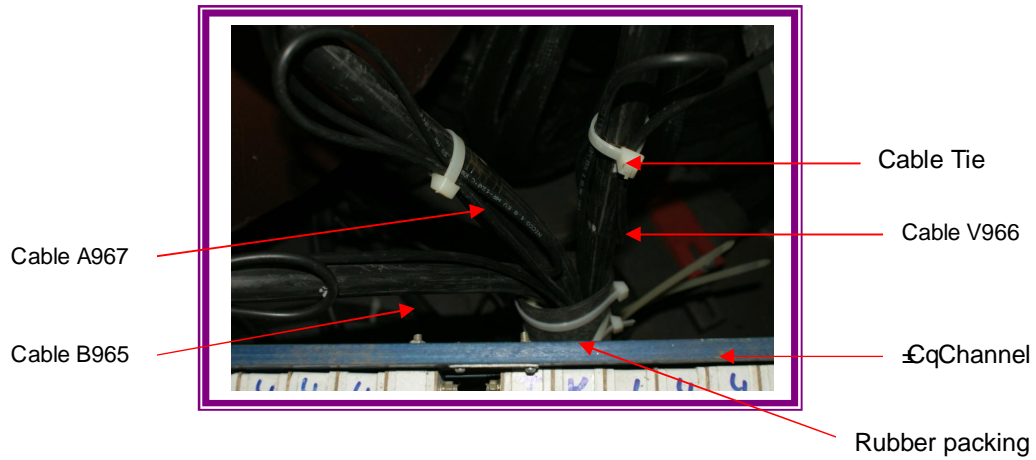
#### 5.16 INNOVATIONS & DEVELOPMENTS

##### *Innovations*

- **MU Operation of loco fitted with Microprocessor based control and fault diagnostic System :** Multiple unit operation of locos fitted with Microprocessor based control and fault Diagnostic System has been successfully completed at CLW on regular basis from March- 2012. Necessary circuit modification has been carried out and RDSO has been advised. Trial has been done with same make and different makes of FDSCS. This will facilitate smooth MU operation of these locos in Zonal Railways.



- **Modification in cable bunching of SIV cable:** Three output cables of SIV has been padded with rubber packing and secured with cable ties to avoid rubbing with  $\phi$ channel.



**Revised pipeline layout for WAP4 loco :** To avoid external hitting of under frame pipe lay out, the same has been shifted from underframe to machine compartment in L side wall with socket arrangements and double ferrule pipe fittings like 3-phase loco, No. 22901 & 22903. Regular cut-in will be made after getting regular supply of brass pipe fittings.





- **RDSO modification implemented IN(i)** No. RDSO/2012/EL/MS/0407 - Standardization of power selection switch position in Flasher unit in 3-phase loco. Implemented from loco No. 31341 and onwards.
  - (ii) No. 390 ó Paralleling of interlock ó Implemented from loco No. 31324, 30308 & 30047 onwards.
  - (iii) No. RDSO/2011/EL/MS/0404 ó Isolation of hard/soft QD during operation of HMCS SWITCH ó Implemented from loco No. 28443 onwards.
- Successful trial has been carried out under NR for operation of WAP-5 in multiple consists. Software modification for the same has been successfully completed at C-D&D/CLW. This will enable running of slave loco, without raising its pantograph, drawing OHE power from master locomotive through the HV cable. This will achieve running of Rajdhani/Shatabdi with 24 coaches at high speed using locos in multiple consists.
- A software modification has been carried out to improve the monitoring of Auxiliary Converter by Vehicle Control Unit (VCU). The software patch has been sent to different Railways for testing in 05 (five) locomotives each before the routine cut-in. This software modification will be helpful in preventing the isolation of Auxiliary Converter during the operation of locomotive.
- A new Induction Heating Puller developed for extraction of inner racer from Hitachi Armatures and 3-phase Rotors.
- 60 nos. Scheme-I type 3-phase Rotor for WAG-9 manufactured at CLW as per RDSO guideline out of which, 38 nos. already sent for field trial, rest are under motor assembly.
- One no. Hitachi Armature developed and manufactured by Traction Motor Shop with 3-phase Insulation Scheme to upgrade insulation class from 200°C to 250°C. This armature assembled in Motor No.11786 and fitted in Loco No.28374, such insulation scheme shall be switched over if performance is improved.

**5.17** Following design and development projects have been implemented in Electric Locomotives under manufacturing at CLW .

- Underslung Compressor : To increase the air capacity and create to the space inside the engine room, 1750 LPM underslung Compressor is provided in Loco No.22926,22975,22976
- WAP-5 Loco provided with MU Coupler : to enable hauling of 24 coaches train upto 160 kmph multiple unit (MU) operation has been provided in WAP-5 locomotives. Loco no. 30069 and 30070 in multiple consist are provided with this system.
- EP assist Brake : For quick release and application of brake in trail lock EP assist brake is provided in WAP-4 Loco no. 22967 & 22968.
- CCB in WAP-5 Loco : Computerized Control Brake system is introduced in passenger version of locomotives in Loco no.30072.
- Modified LSDBR Circuit : to avoid wrong indication of working of AC MVRF in MPCS fitted loco signaling light LSDBR circuit modified and introduced from loco no. 28627 onwards.
- Marker Light Circuit Modified: Marker light circuit modification implemented on regular basis.
- DU type Relay: In place of PC-8 type Relay DU type (QSIT) is introduced for flap type indication to the driver in aux. static converter circuit in conventional WAG-7 locomotive from loco no. 28632 to 28636.
- IGBT based Locomotives : Latest IGBT technology based power converter and aux converter have been introduced in place of existing GTO based converter in CLW make locomotives. 44 nos. locomotives have been dispatched with IGBT converter up to 31<sup>st</sup> December 2013.
- Indigenous IGBT Propulsion system : Indigenous IGBT based propulsion system comprising traction converter, aux converter & VCU developed by M/s Medha has been successfully commissioned in loco no. 31427 . Loco is presently in field trial under SCR.

6

# QUALITY ASSURANCE

# 6.QUALITY ASSURANCE

## 6.1. Quality Objective & Targets:

6.2 . Inspection of locomotives and its components in the inspection shop to be done .100% strictly on the basis of work instruction and their related Design , Drawings, Specifications and Standard to meet Quality requirement on continuing basis.

6.2.1. Inspection within fortnight from date of receipt of call letter for inspection of purchase items.

6.2.2. 5% of total inspection of Outstation Vendors or minimum 5 numbers of inspection offered per Month are to be personally inspected by the outstation office incharge.

( N.B SL.No. 6.2.1 &6.2.2 above are applicable only for Outside Inspection wing of CLW i.e. **DYCEE/I&D/NDLS, DYCEE/I&D/MUMBAI, DYCEE/I&D/Bangalore &DyCME/I&D/HWH**)

## 6.3 Other Objectives:

6.3.1 Constant Endeavour for quality improvement of the products at all stages of manufacturing which are turned out from different shops of CLW.

6.3.2 To carry out inspections of various assembly and sub-assembly being manufactured in Traction Motor shops, Static Equipments Shops, Heavy m/c shop, light m/c shop, Loco fabrication shops and Steel Foundry shops as well as assembly and dispatch of locos.

6.3.3 To certify the Material Movement Slip for movement of products conforming to the drawing/WI/ Specification from one shop to other and consequently clearing job Cards related to that product.

6.3.4. To prepare Loco inspection Certificates and sent them to user Railways. Instead of manual feeding of the Inspection data on Standard Formats to prepare Loco IC,100% scanned Soft copy of Loco inspection Certificates will be prepared from the financial year 2014-15 onwards.

## 6.4 Achievements:

6.4.1. Inspections of Steel foundry group has been trained to inspect the fabricated items like long beam,End structure,Middle box and End box of conventional loco &roof,Central Under frame,Head stock,Cow catcher,Side and centre sill of three phase locomotives which are being presently fabricated at Steel foundry.

6.4.2. 100% radiography test on Hitachi Suspension Tubes has been implemented w.e.f Feb-2014 to minimize the casting defects.

6.4.3 The Lateral Clearance (Std: 22.0mm to 25.2 mm) of WAG-7 Bogie has been improved by constant monitoring and strict repetitive booking.

6.4.4. Axle Box clearance (Std: 2.0mm to 4.0 mm) of WAG-7.Bogie has been improved by repetitive booking and constant monitoring.

6.4.5. Clearance of Bogie frame and TBU/PBU brake hanger lever (Std:13mm) of WAG-9H loco has been improved (almost 100%) by repetitive booking and close monitoring.

6.4.6. Fitment problem of brake shoes on wheel for three phase loco has been eliminated about 80% by implementing check point on dimension of Bogie frame brake support tube and fork centre to side frame J/L (Std: 24.3 mm).

6.4.7. The huge back log (due to change in format of loco ICs and other unavoidable reason) of preparation of Loco Inspection Certificate and issue the same to user shed have been almost up dated by clearing record 545 numbers of loco ICs in ten months (w.e.f. Ist July 2013 to 7<sup>th</sup> April 2014).

## 6.5 METALLURGICAL & CHEMICAL LABORATORY

Metallurgical & chemical Laboratory headed by Deputy Chief chemist & Metallurgist , and assisted by associated officer of Chemical and Metallurgical wing is responsible for quality assurance of Electric Loco components by conducting metallurgical , chemical and non-destructive test of casting , forging & fabricated components as well

as physical-chemical test of non-metals , rubber items , paints & oil lubricants . It consists of three units i.e main Lab., NDT Lab, ioco works and Steel Foundry.

The M & C Laboratory ensures quality control of inputs and finished products of Steel Foundry including stage wise process control. The M&C wing of Steel Foundry developed CBC coupler & its component as per RDSO Specn. 56BDO7 for Electric Locomotives, Wagon Coupler as per RDSO Specn.48BD08 & also E-type coupler for EMD Locomotives of DLW.

Quality control of castings like CO ó CO Bogie, FC bogie, Bolster, Casnub bogie, Suspension tube high tensile CBC Coupler etc. being closely monitored by M&C department for heat treatment cycle & their mechanical & metallurgical properties.It also ensures quality control of different raw material of Steel Foundry like Ferro ó manganese, Silico ó Manganese, Ferro-silicon, Ferro- molly, iron ore, silica sand, core binders, bentonite power etc. It is also ensures quality control of furnace consumables like basic lining bricks, high alumina bricks, ladle bricks etc. M&C Lab of SF consists of Central Lab,NDT Lab, Field Furnace Lab etc.NDT Lab./SF arranges radiography as per RDSO Specn of various heavy critical steel casting to ensure casting quality as per specification.

Main activities of M&C organization is as under:-

- xxi) CLW Steel Foundry now as a Class ó A foundry as per IS 12117 : 1996 & approved by RDSO/LKO.
- xxii) Steel Foundry indigenously developed high tensile CBC Coupler for Electric locomotives as per RDSO Specn. 56BD07 , Wagon Coupler as per RDSO Spec. 48BD08 & approved by RDSO/LKO.
- xxiii) CLW Steel Foundry also recently developed E-type Coupler for EMD Locomotive for DLW.
- xxiv) CLW Steel Foundry got a developmental order (40 nos.) for ðH-typeölight lock coupler for DLW.
- xxv) CLW Steel Foundry started training to welders (48 nos.), oxy-cutter(35 nos.) & fettler(105 nos.) from Govt. Training Institute, ATI, Das Nagar/Howrah for betterment of fabrication as well as heavy casting for finishing quality work.
- xxvi) CLW Steel Foundry is also sending JE/SSE (60 nos.) for total personality development training programme at Ludhiana for quality improvement & enchasement of latest modern foundry technology practices.
- xxvii) Internal & external ISO: 9002 & ISO: 14000 audits as per ISO requirement & timely calibration of testing equipment.
- xxviii) Testing of Loco items as per loco production target to meet the requirement.
- xxix) Testing of water samples and controlling various parameters of drinking water requirements.
- xxx) Review of specification from time to time for quality improvement.

Metallurgical & Chemical Lab conducts metallurgical investigations of in-service failures of components of CLW build locomotives. It maintains liaison with RDSO , BIS & other Non-Railway institutions on M&C matters.

The laboratory is being further upgraded by procuring state of the art UTM of 100 online test reporting system.

M&C Department is also in a project stage of computerization , upgradation of online test reporting system.

### 6.5.1 PERFORMANCE w.e.f. 01-01-2013 to 31.12.2013

#### 6.5.1.1 METALLURGICAL & CHEMICAL LAB/LOCO: (.1.1.13 to 31.12.13 ))

Sl. No.	Name of Lab.	No. of Sample Tested			Nos. of Tests			No. of Sample Accepted			% of Rejection		
		2011	2012	2013	2011	2012	2013	2011	2012	2013	2011	2012	2013
1.	Metallurgical/ Mechanical Lab.	1530	2667	3135	2918	6983	6637	1407	2580	3040	8.03	3.26	3.15
2.	Chemical Lab.	2508	3559	3421	14673	20504	19489	2446	3509	3392	2.47	1.4	0.93
3.	Filter House Lab	1960	1993	2014	15241	16670	16895	1960	1993	2014	Nil	Nil	Nil
4.	Rubber , DMC, I. M. &	169	311	257	274	456	354	162	271	235	4.14	12.86	8.56

	Lubricant												
	<b>TOTAL</b> →	<b>6167</b>	<b>8530</b>	<b>8827</b>	<b>33106</b>	<b>44613</b>	<b>43376</b>	<b>5975</b>	<b>8353</b>	<b>8681</b>	-	-	-

#### 6.5.1.2 NDT LABORATORY (LOCO):

Sl. No.	Name of Lab.	No. of Sample Tested			Nos. of Location/ Component Tested			Nos. of Component accepted			% of Rejection		
		2011	2012	2013	2011	2012	2013	2011	2012	2013	2011	2012	2013
1.	Ultrasonic Testing	5594	6991	9786	17380	22253	27744	5519	6939	9513	0.37	0.74	2.78
2.	M P T	7135	5975	5517	21020	18480	15315	7135	5975	5510	0.28	Nil	0.12
3.	Radiographic Test	360	251	166	360	251	166	360	251	Nil	Nil	Nil	-
4.	Misc.	370	374	1709	968	937	3114	370	374	1696	Nil	2.94	0.76
	<b>TOTAL</b> →	<b>13459</b>	<b>13591</b>	<b>17178</b>	<b>39728</b>	<b>41921</b>	<b>46339</b>	<b>13384</b>	<b>13539</b>	<b>16719</b>	-	-	-

#### 6.5.1.3 METALLURGICAL & CHEMICAL LABORATORY /STEEL FOUNDRY:

#### 6.5.1.4 CHEMICAL LABORATORIES:

Sl. No.	Name of Lab.	No. of Sample Tested			Nos. of Tests		
		2011	2012	2013	2011	2012	2013
1.	Chemical Lab.	3520	3118	2773	18336	17498	16770
2.	Chemical Misc.	166	62	135	1138	361	949
	<b>TOTAL</b>	<b>3686</b>	<b>3180</b>	<b>2908</b>	<b>19474</b>	<b>17859</b>	<b>17719</b>

#### 6.5.1.5 FIELD LABORATORY/S. F. :

Sample Test					Physical & Radiographic Tests			
Sl. No.	Name of Test	No. of Tests			Name of Test	No. of Tests		
		2011	2012	1.1.13 To 31.12.13		2011	2012	1.1.13 To 31.12.13
1.	Zircon Wash	44	30	39	Tensile Strength	1436	1484	1250
2.	Green Sand	5799	6644	5689	Microstructure	426	395	505
3.	Permeability	994	1093	983	Charpy	0	-	0
4.	No-bake Sand	554	1048	958	Hardness	135	142	985
5.	Silica Sand	74	79	76	Radiography Exposures	9566	10975	11119
	<b>Total</b>	<b>7465</b>	<b>8963</b>	<b>7745</b>	<b>Total</b>	<b>11563</b>	<b>12996</b>	<b>13859</b>

7

# Marketing including export

( Supply of spares to Zonal Railways )

## **7. Supply of spares**

### **7.1 LIAISON & SERVICES WING:**

There are 27 Electric Loco Sheds and 7 POH/Repair shops on the Indian Railways, which are engaged in the operation/maintenance of Electric Locomotives. The Liaison and Service (L&S) Wing of CLW has to perform the task of meeting the requirements of Capital spares allotted by Railway Board & Railways own needs of Spares for their loco sheds and workshops. Broadly Liaison and service wing performs the following functions.

### **7.2 FUNCTIONS:**

The salient functions of L& S wing are as under:

- Consolidating the demands in the form of Requisitions/indents from Railways for purchased, Shop manufactured as well as imported items.
- Co-ordination with Stores department for the procurement of purchased items and to issue work orders from the shop manufactured item.
- Supplying spares to railways through stores/shops taking due care of demands and availability. L&S wing also maintains the accountal of such supplies.
- Monitoring of Performance of new locomotives built by CLW and dispatched to various Electric loco sheds, by way of getting feedback from the Railways.
- With the population of Electric Locomotives increasing steadily, the task of Liaison and Sales Wing has increased for effective monitoring of the performance of newly built Electric locomotives and for providing support for the capital spares as well as the requirement of spares by the Railways for maintaining the Locomotives in service.

### **7.3 SPARES TO RAILWAYS:**

The supply of spares to various user Railways is one of the most important function of L&S wing. All-out efforts are made to fulfill the demands of Capital spares as well as the requirement of spares by the Railways. In the year 2013-14 spares worth Rs90.77crores (as on 31.12.13) were supplied to the Railways as compared to Rs. 93.97 crores in the year 2012-13. The break up of the same may be seen at Annexure -A.





**Supply of spares to Zonal Railways against Rly. Board's RSP & Requisitions of Zonal Railways in December-2013**

ANNEXURE - 'AØ (All Costs are in Rs. lakh)

Sl.	Item description	QUANTITY SUPPLIED DURING March 2012												Total qty.	Total cost of supply							
		CR B/Req	ECOR B/Req	ECR B/Req	ER B/Req	NCR B/Req	NR B/Req	SCR B/Req	SECR B/Req	SER B/Req	SR B/Req	WCR B/Req	WR B/Req									
1	TM for G-9/P-7 (3 )																	2	2	44.39		
2	TM for P-5 (3 )																					
3	Stator of TM for G-9 (3 )																					
4	Rotor of TM for G-9 (3 )																					
5	Rewind Stator (3 )																					
6	Transformer of G-9 (3 )																					
7	Transformer of P-5 (3 )																					
8	Auxiliary Converter (3 )																					
9	Central Electronics (3 )																					
10	Traction Converter (3 )																					
11	Speed Sensor (3 )																					
12	Master Controller (3 )																					
13	O.C.U (Blower + Radiator) (3 )					2														2	6.60	
14	HB-1/HB-2 (3 )																					
15	E-70 Brake System (3 )																					
16	Access tool/ Diagnostic System (3 )																					
17	Trade brake arrangement(3 )																					
18	TM (Hitachi)	3				5			5			3	6	3						25	782.25	
19	TM (H)-Armature																					
20	Transformer 5400 KVA																					
21	Static Converter																					
22	VCB																					
23	DBR (Roof Mounted)																					
24	DBR (Vertical)																					
25	RSI																			1	1	16.04
26	Tap Changer																					
27	Microprocessor Based Control & Fault Diagnostic System																					
28	DI/DU Relay																					



**Supply of spares to Zonal Rlys against Rly Bd's RSP & requisitions of zonal Rlys from April 2013 to Dec.2013**

**(ANNEXURE-B) (All Costs are in Rs. Lakh)**

Sl.	Item description	QUANTITY SUPPLIED FROM 01.4.13 TO 31.12.13														Total qty.	Total cost of supply								
		CR B/Req	ECOR B/Req	ECR B/Req	ER B/Req	NCR B/Req	NR B/Req	SCR B/Req	SECR B/Req	SER B/Req	SR B/Req	WCR B/Req	WR B/Req												
1	TM for G-9/P-7 (3 )				2*	3					3	2	2			2		2				16	387.64		
2	TM for P-5 (3 )																								
3	Stator of TM for G-9 (3 )																								
4	Rotor of TM for G-9 (3 )								3			8											13	89.46	
5	Rewind Stator (3 )																								
6	Transformer of G-9 (3 )																	2					2	247.84	
7	Transformer of P-5 (3 )																								
8	Auxiliary Converter (3 )					1														1			3	201.10	
9	Central Electronics (3 )						1														1		3	86.88	
10	Traction Converter (3 )					1															1		3	773.07	
11	Speed Sensor (3 )																								
12	Master Controller (3 )		2																				2	3.50	
13	O.C.B Unit (3 )		2			4	4				4												14	54.35	
14	HB-1/HB-2 (3 )																								
15	E-70 Brake System (3 )						1																1	33.40	
16	Access tool / Diagnostic System (3 )																								
17	Trade brake arrangement(3 )						2																2	51.51	
18	TM (Hitachi)	13	2	3		9	9	6	2		5		9		6	9	15		3			17	108	3059.26	
19	TM (H)-Armature																								
20	Transformer 5400 KVA			1												3							4	157.44	
21	Static Converter						1	1			2												4	95.14	
22	VCB					2															2		4	11.14	
23	DBR (Roof Mounted)																								
24	DBR (Vertical)																								
25	RSI		1			2			1		2					1						1	8	122.16	
26	Tap Changer																								
27	Microprocessor Based Control & Fault Diagnostic System																								
28	DI/DU Relay												12										12	53.62	
29	Smoothing Reactor (SL-30)												2		4								6	57.18	
30	Reverser-J																								
31	C.T.F																								
32	E.M.C																								



8

# STATUS OF M&P

## 8. MACHINERY AND PLANT

### Manufacturing, M&P Maintenance, Transport, Machinery & Plant Procurement

Manufacturing group of shops consists of Heavy machine shop, Wheel shop, Light machine shop, Smithy & Forge shop, Heat Treatment shop and Tool Room. Millwright and Electrical Maintenance shops look after maintenance of all M&Ps of loco works, power supply and distribution inside loco works. MPP cell deals with planning and process for procurement of machines sanctioned by Rly.Board under M&P Plan Head-4100 & 4200. It also looks after TPT shop including Road and Industrial vehicle maintenance work and shunting work. M&P section deals with commissioning of new heavy machines and warranty issues.

#### 8.1 Manufacturing shops:

(i) Wheel Shop: **Wheel shop manufactures wheel sets for loco production as well as spares to Zonal Railways. Presently wheel sets for WAP4, WAP5, WAP7, WAG7 and WAG9 locos are manufactured.**

(ii) Heavy Machine shop: **Heavy machine shop undertake machining of components for loco production as well as meeting the spares required for zonal railways such as suspension tube, 3-ph stators for WAG9 & WAP5 locos, Hitachi Magnet Frame, Equalizer & Compensating beams etc.**

Machining work of Steel Castings from Steel Foundry like centre pivots of WAP4, CBC Coupler are also done in HMS.

(iii) **Smithy & Forge shop:** SFS undertakes fabrication of Head Stock of WAP7 loco, forging of small components of loco assembly, assembly of casnub bogie.

(iv) **Light Machine Shop:** Light Machine Shop manufactures small components like bushes, traction motor blower holding plates etc. to meet requirement of loco production as well as spares required for zonal railways.

(v) **Tool Room:** Tool room supplies toolings, gauges, jigs & fixtures for production requirements of various shops also carries out calibration of various gauges, fixtures, instruments etc to meet the ISO requirements.

(vi) **Heat Treatment Shop:** Heat Treatment Shop undertakes heat treatment of bogies manufactured in Loco Shop and other items e.g. Magnet Frame, Equalizer, Compensating Beams etc. manufactured in Heavy Machine Shop.

**Performance of Manufacturing Shop is furnished in the Annexure-‘A’**

#### **BRIEF REGARDING PLANT MAINTENANCE ORGANISATION (LOCO WORKS)**

CLW has more than 1500 M&Ps including 117 Nos. Cranes in Loco Works, out of which 50% of M&Ps are overaged. The breakdown as well as preventive maintenance of M&Ps is carried out by the Plant Maintenance Organisation consisting of Millwright Shop (MTS-56) and Electrical Repair Shop(Shop-59). Plant Maintenance Organisation deals with repairing, reconditioning, re-engineering, retro-fitment of machineries and plant. Installation of new small machineries and plants, condemnation & uprooting of old M&Ps are also carried out by the Maintenance Shops-56 & 59.

#### **8.4 SPECIAL WORK DONE DURING 2013-14**

7. HMT CNC Profile Milling Machine (No. 05/2598/01), a vital machine of ELB Shop was under long breakdown due to defective PCU-50. The machine has been repaired successfully by providing new PCU-50 and backup software. The machine has been working satisfactorily since then.
8. Zayer -1 CNC Bogie Machining Centre, a very vital machine of Shop-18 for bogie machining was under breakdown from 21.12.2012 due to defective PCU of Siemens make. The warranty of the machine has also expired. The defective PCU has been repaired with the assistance of Siemens and the machine has been put back into service for production. The machine is running satisfactorily since then.
9. HYT Double Headed Boring Machine No. 08/1887/01, a critical machine of HMS, went under major breakdown due to spindle barrel jam, damage of spindle box nut bracket. The machine has been repaired thoroughly in-house by MTS without OEM's support and the machine is working satisfactorily for production of Hitachi Suspension tube.
4. 400T Hydraulic Press brake is a very vital machine for shell production. It went under breakdown from 24.06.13 due to defects in CN controller. The defective CN controller has been repaired inhouse by dedicated CNC team of ERS and the machine has been put back into service for regular production.
5. Craven Milling M/c No. 05/2310/03 of ELB Shop/05, a very old machine installed in the year 1951 went under breakdown due to failure of axis drive motor. The machine has been repaired inhouse jointly by MTS & ERS. The machine has been working satisfactorily since then.
6. BH-160-II Machine of ELB/Shop-18(M/c No. 18/2596/02) went under breakdown due to failure of AC drive motor for column movement. The machine has been repaired in house by ERS making alternative arrangement by providing DC Motor with suitable modified circuit. The machine has been handed over to production.
7. Zayer-1 CNC Bogie Machining Centre(18/2463/01) for Bogie Machining went under breakdown due to leakage of refrigerant through rubber hose pipe inside vertical head of the machine. Maintenance Wing(MTS) replaced the damaged pipes with copper pipes & re-aligned the same with connectors to arrest the leakage. The machine has been re-commissioned and handed over to production.
8. Denobat CNC Axle Turning Lathe(M/c No. 09/1114/01) of Wheel Shop installed in 2009 is a very vital machine for production of finished axle of wheel set. This machine went under breakdown on 09.9.13 due to heavy leakage of coolant from the conveyor housing. The defects have been repaired in house thoroughly by MTS.
9. The EOT Crane No. S/E/03 of NP Yard went under major breakdown due to crack of both LT gear box housing. The same have been repaired inhouse thoroughly, re-assembled by MTS and the crane has been handed over for use.
10. The EOT Crane No. S/E/03 of NP Yard went under major breakdown due to crack of both LT gear box housing. The same have been repaired inhouse thoroughly, re-assembled by MTS and the crane has been handed over for use.
11. Relaying of Main Compressor Pipe Line raising its height suitably has been done at five main locations between T.O Gate to ELF/Shop-26 area to facilitate infringement-free passage of high height consignments like wooden casing containing M&Ps and Loco shells coming from trade.
12. Bristol EOT Crane(No. 26/E/03) of Shell Shop-26 installed in the year 1963 went under breakdown from 19.09.13 due to wear & tear of LT Shaft, Brake Drum, Wheel bearings, Couplings etc. and the condition was such that it was not safe to operate. Major repair work on this crane has been done replacing the old and worn out parts and commissioned successfully.
13. Jordi Shearing M/c No. 15/7065/01 of Shop-15 had been giving trouble after commissioning in the year 2009. Finally, the machine went under breakdown on and from 25.02.12 due to defects in PLC. The machine has been repaired after procuring & installing new PLC and commissioned on 28.11.13.
14. Marufuku Plano Miller of ELB/Shop-18 is a very old but vital machine, installed in the year 1981. This machine went under breakdown from 26.10.13 due to complete damage of pendent cables cause by rodent.

The machine has been thoroughly repaired inhouse by Electrical Maintenance Wing with new rewiring and commissioned. The machine is being utilized by production shop for bogie machining since then.

### **8.3 SAVINGS IN MACHINE HOUR LOSS IN HRS.**

<b>Month</b>	<b>2012-13</b>	<b>2013-14</b>
<b>April</b>	<b>2749</b>	<b>2733</b>
<b>May</b>	<b>2716</b>	<b>2704</b>
<b>June</b>	<b>3165</b>	<b>3152</b>
<b>July</b>	<b>3070</b>	<b>3054</b>
<b>August</b>	<b>2716</b>	<b>2704</b>
<b>September</b>	<b>3421</b>	<b>3408</b>
<b>October</b>	<b>3426</b>	<b>3421</b>
<b>November</b>	<b>2878</b>	<b>2864</b>
<b>December</b>	<b>3374</b>	<b>3357</b>
<b>Total</b>	<b>27515</b>	<b>27397</b>

### **SAVING IN MACHINE HOUR LOSS**

Machine hour loss upto December, 13 during the year 2013-14 has been 27397 hours as against 27515 hours during the corresponding period of the previous year. Thereby, saving in Machine Hour loss till December, 13 has been 0.42% with respect to the previous year (2012-13).

### **8.6 UPTIME AVAILABILITY OF CRITICAL MACHINES**

The availability of 80 critical machines in Loco Works has been 95.64% during the year 2013-14 as against the target of 92%. The uptime availability of 80 critical machines was 94.72% during the corresponding period of the previous year (2012-13).



### **8.5 Production Performance of manufacturing shop**

Sl.No	Name of Item	2011-12	2012-13	2012-13 (upto Decø12)	2013-14 (upto Decø13)	Comparison of Prod. 2013-14 with 2012-13 Excess(+) Less(-)
1	Wheel Set Assembly	275 L/S	291 L/S	213 L/S	202 L/S	-11 L/S (Non-availability of WAG9/WAP7 wheel disc and main gear of WAP5)
2	Hitachi Susp. Tube	552 nos.	537 nos.	426 nos.	206 Nos.	- 220 nos. (Conventional loco target reduced by 22 L/S and material received from Trade)
3	Hitachi magnet frame	189 nos.	190 nos.	136 nos.	123 Nos.	-13 nos. (Non-availability of Steel Components of Magnet Frame Kit)
4	Stator 3 Phase	394 nos.	394 nos.	288 nos.	333 Nos.	+45 Nos.
5	Equalizer	139 L/S	120 L/S	93 L/S	82 L/S	-11 L/S (Conventional loco target reduced by 22 L/S)
6	Compensating Beam	141 L/S	120 L/S	94 L/S	82 L/S	-11 L/S (Conventional loco target reduced by 22 L/S)
7	WAG-9 Head Stock	39 L/S	47 L/S	31 L/S	42 L/S	+11 L/S

## **8.6 STATUS OF MPP & M&P SECTION.**

### **1. PLAN HEAD: 4100**

(i) INDENTS PLACED DURING THE YEAR 2013-14 (Position as on 01.01.14) :-

( From April 2013 to December 2013 )	COS	COFMOW	TOTAL
	07	Nil	07

(ii) MACHINES FOR WHICH P.O. DUE (Position as on 01.01.2014)

No. of Machines for which P.O. due		Total
COS	COFMOW	12
12	Nil	

(iii) P.O. PLACED DURING THE YEAR 2013-14 ( Position as on 01.01.14 )

COS	COFMOW	TOTAL
05	01	06

### **2. PLAN HEAD: 4200**

(i) INDENTS PLACED:- (Position as on 01.01.2014)

( From April 2013 to December 2013 )	COS	COFMOW	TOTAL
	Nil	Nil	Nil

(ii) MACHINES FOR WHICH P.O. DUE (Position as on 01.01.2014)

No. of Machines for which P.O. due		Total
COS	COFMOW	10
07	03	

(iii) P.O. PLACED DURING THE YEAR 2013-14 ó (Position as on 01.01.2014 )

P.O.PLACED	COS	COFMOW	TOTAL
	02	Nil	02

(iv) PROGRESS OF WORKS (M&P) :- ( as on 01.01.2014 )

Particulars	Total no. of m/cs. sanctioned	Dropped	Recd.	Under procurement
50 Loco Project :- Augmentation of facilities for enhancement in production capacity of 3-phase locos to 50 locos per year.(Total 11 items )	11	04	04	03
200 Loco Project :- Creation of addl. Facilities for enhancing the production capacity of CLW up to 200 locos per year.	30	04	20	06
275 Loco Project :- Modernisation & Augmentation of production capacity from 200 to 275 Elec.Loco per annum.	18	03	06	09
<b>TOTAL</b>	<b>59</b>	<b>11</b>	<b>30</b>	<b>18</b>

**3.Progress of works by M&P Deptt. (Position as on 01.01.2014)**

Particulars	M&Ps Received	M&Ps Under commissioning	M&Ps Commissioned.
M&P items sanctioned by Rly.Board under PH-41	03 ( from April to Decø13 )	09	09
GMø Out of turn items under Under PH-41	08 ( from April to Decø13 )	06	20
Project items ( 200 Loco Project & 50 Loco Project & 275 Loco Project . ) Under PH-42	03 ( from April to Decø13 )	03	06
<b>Total</b>	<b>14</b>	<b>18</b>	<b>35</b>

**Machines under Installation & Commissioning – 18 Nos. ( As on 01.01.2014 )**

(i) Plan Head ó 4100 ( M&P Prog.items)

S.N	Sanction	Case No.	Description, Qty & PO cost
1	M&P/ 07-08	MT/1879	Travelling Column Milling machine- 01no. <b>Cost ₹5.35 crore,</b>
2	M&P 08-09	MT/1890	Robotic Welding Plant with manipulator <b>Cost ₹ 4.44 crores,</b>
3	M&P 05-06	MT/1748	High speed continuous Sand Mixer with Sand Reclamation plant-01 no Cost ₹ 2.8cr
4	M&P 09-10	MT/2052	Routine Test plant for testing 3-phase asynchronous motor-01 no. <b>Cost ₹ 2.32crore.</b>
5	M&P 09- 10	MT 2045	Electric Arc furnace, Cost ₹ 6.16 crores,
6	M&P 10- 11	MT /2095	Mig welding m/c ó 38 nos, Cost (188632 EURO x 71.56)= ₹ 1,34,98,505
7	M&P 10- 11	MT/2093	Mig welding m/c ó 30 nos, Cost (148920 EURO x 71.56) = ₹ 1,06,56,715
8	M&P 10-11	MT /2097	Axle grinding m/c. (Morara), <b>Cost ₹ 45744587.7 lakhs</b>
9	M&P 07-08	MT/ 1904	Plasma Cutting m/c. Cost ₹ 1.42 Crores.

(ii) PH-4100 ( GMø Out of Turn Items )

Sl. No	Sanction.	Case No.	Description, Qty. & PO Cost
10	OT/ 09-10	MT/2082	Centre Lathe- 01 no. Cost ₹ 9.42 lakhs,
11	GM 08-09	MT/1998	Radial Drilling m/c., Cost ₹ 21.75 lakhs
12	GM 08-09	MT 2003	Radial Drilling m/c. Cost ₹ 21.75 lakhs
13	GM/OT 09-10	MT/ 2069	Universal Testing m/c 100T., Cost ₹ 17.51 lakhs
14	GM / 08-09	MT / 2001	Air compressor 1000 CFM, ₹ 27.89 lakhs
15	GM / 11-12	MT/2147	Calibration system, ₹ 29.93 lakhs

(iii) Plan Head-4200

Sl. No	Sanction	Case No.	Description, Qty. & PO Cost
16	275 Loco	MT/AP/275/07	Axle Turning M/c, Cost ₹ 1.69 crores
17	275 Loco	MT/AP/275/08	Axle Turning M/c, Cost ₹ 1.69 crores
18	PH 42, 50 Loco	(MT/AP/50/048 )	Paint booth, ₹ 7.4679 crore

**8.7 Machines Commissioned – 35 Nos. (from April'13 to 01.01.2014)**

M&P Prog.Items ( PH-41 ) : -09 Nos.

Sl No	Item No. & Yr. of san.	Description & Qty.	MT No	Supplier's Name/A.T / PO no.	Consignee/ Location
1	M&P 06-07	CNC Vertical Turret Lathe, Max. Turning Dia.800mm, Cost ₹ 4.16 crore.	MT/ 1787	M/s. Premier Ltd./Pune, P.O no.05/ 2007/7068/90211 dt.01.12.2010.	Dy.CME/Mfg. , WS-09.
2	M&P 07-08	Advanced Fire Fighting system, cap.600Ltrs. /01no., Cost ₹24.04 Lakhs	MT/ 1932	M/s. Udyogi Plastic Ltd. Kol, P.O no.05/2007/ 7020/71756 dt.03.07.08	SC/RPF At CRJ
3	M&P 07-08	Loco lifting Hyd Jack	MT/ 1921	M/s. Hydrodyne, Sitarampur, P.O no.05/2007/7063/71763 dt. 21.08.09	Dy.CME/ ELA
4	M&P 09-10	Heavy Duty Universal machining Centre with automatic Pallet Changer- 01no. Cost- Euro 14.4lakhs, Indian components- 35 lakhs	MT/ 2043	M/s. MAG India Industrial Automation Systems Pvt. Ltd., Bangalore, G-539 opened on 29.03.2010,	Dy.CME/ Mfg. HMS-09, bay-10
5	M&P 11-12	Truck, Cap-10T, 01 no., Cost ₹ 12.08 lakhs	MT/ 2129	M/s. Tata Motors Ltd., Mumbai, P.O no.05/2011/ 7003/91931 dt.07.12.2011	Dy.CME/MPP
6	M&P 11-12	Bus 32 Seater- 01 no.	MT/ 2128	M/s. Tata Motors Ltd., Mumbai, P.O no.05/2011/ 7004/91982 dt.07.12.2011.	AWM/TPT
7	M&P 11-12	Crane EOT-5T, 1 no., Cost ₹ 20.02 lakhs	MT/ 2134	M/s. Indiana Machine Tools, Mandigobindgarh, OP-2117	Dy.CME/Mfg.
8	M&P 11-12	Dumper Truck 10T, ₹16.18 lakhs	MT/ 2126	M/s. Tata Motors, P.O no. 05/2013/ 7001/ 01556 dated-20.03.13.	Dy.CME/MPP
9	M&P 12-13	500T Wheel Press. ₹ 276.93 lakhs	MT / 2148	M/s.A.J.Machine Tools, AT No. COFMOW, G-601	Dy.CME / Mfg.

GM Out of turn Items (PH-41):- 20 Nos.

Sl No	Item No. & Yr. of san.	Description & Qty.	MT No	Supplier's Name/A.T / PO no.	Consignee/ Location
10	GM OT/ 07-08	Combination therapy unit, 01 no.	MT/ 1972	M/s. International Electro Medical Co., NDLS, 05/2007/7099/71780 dt.17.09.08.	CMS/KGH
11	GM OT 08-09	S.J. Coil Winding machine-01no., Cost ₹ 5.99 lakhs,	MT/ 2026	M/s. TAMKAN, Asansol, P.O no. 05/2008/7114/71889 dt.17.02.10.	Dy.CEE/TMM
12	GM OT 08-09	Rad. Drilling m/c. Cost ₹ 21.75 lakhs	MT. 1999	M/s. Energy Tools, Gujrat, OP-1991 dt. 14.09.10	Dy.CME/Mfg.
13	GM OT 08-09	Hydraulic Crimping machine- 02 nos., Cost ₹ 9.36 lakhs.	MT/ 2035	M/s. Santragachi Engineering Co., Howrah, P.O no. 05/2008/71133/89774 dated-13.08.10.	Dy.CEE/EL
14	GM OT 08-09	Rotary Gellation Plant -02 nos Cost ₹ 17.64 lakhs	MT/ 2024	M/s. Heatem Engineering Co., P.O no. 05/2008/7115/89897 dated-14.09.2010.	Dy.CEE/ TMM, VPI shed, shop-23
15	GM OT/ 09-10	Digital Surge Comparison Tester with concomitant accessories- 04 nos Cost ₹ 16.13 lakhs	MT/ 2064	M/s. Vivid Metrawatt, Mumbai, P.O no.05/2009/7111/90824 Dt.28.03.11	Dy.CEE/ TMM, shop-23
16	GM OT/ 09-10	VCB Trolley 1250 Amps., 01 no. Cost ₹ 3.90 Lakhs	MT/ 2074	M/s. Allied Engineers, Kolkata P.O no.05/2009/7138/00603 dated-12.10.12.	Dy. CEE/M
17	GM OT/ 09-10	VCB Trolley 630 Amps., 06 nos, Cost ₹ 22.42 lakhs	MT/ 2076	M/s. Allied Engineering, Kolkata, P.O no. 05/2009/ 7139/00743 Dtd-12.11.12.	Dy. CEE/M
18	GM OT/ 09-10	Radial Drilling M/c. -1 no., Cost ₹ 18.3 lakhs	MT/ 2071	M/s. Energy Machine Tools Pvt. Ltd., Jamnagar, OP-2006 dated- 28.10.10	Dy. CME/ Mfg
19	GM OT 09-10	Cable fault locator, Cost ₹ 25.59 lakhs	MT/ 2077	M/S Bluemax Entreprise, Kolkata, P.O no.05/2012/ 7112/ 01602 dated- 10.04.2013	Dy.CEE(M)

20	GM OT 09-10	Spilt Casing Pump, -04 nos. ₹ 23.24 lakhs.	MT/2073	M/s.Electromechanical , Kolkata P.O.No.05/2009/7137/00171 dtd. 31.8.12.	Dy.CEE ( M )
21	GM OT/ 09-10	Induction Heater -01no., Cost ₹ 59.2 lakhs	MT/ 2080	M/s. Precision Instruments & Allieds, Mumbai, P.O no. 05/ 2009/7117/90713 dtd-15.03.11	Dy.CEE/TMM
22	GM OT 10-11	Autoanalyser , Cost ₹ 10.76 lakhs	MT 2122	M/s. Tulip Diagonistics Pvt Ltd, Goa, P.O no.05/2011/ 7119/ 92768 dated-13.12.12	CMS/KGH
23	GM OT 10-11	Radial Drill Machine- 01no. Cost ₹ 16.07 lakhs	MT/ 2101	M/s. Energy Machine Tools Pvt. Ltd. Jamnagar, OP-2094 opened on 21.10.11.	Dy. CME/ Mfg
24	GM OT / 11-12	ICU Ventilator, 01 no. Cost ₹ 16.19 lakhs.	MT/ 2142	M/s. Sigma Medical System, Kol, P.O no.05/2012/7110/01087 dated- 07.01.2013.	CMS/KGH
25	GM OT / 11-12	Defibrillator with Bedside Monitor, 01 no. Cost ₹ 2.37 lakhs	MT/ 2139	M/s. P. Bhogilal Inc. Kolkata, P.O no. 05/2012/ 7106/00950 Dtd- 11.12.12.	CMS/KGH
26	GM OT / 11-12	Spiro meter, Qty. 01 Cost ₹ 1.44 lakhs(P)	MT/ 2145	P.O no. 05/2012/7105/00698 dated- 30.10.12	CMS/KGH
27	GM OT / 11-12	Non-Motorised bed with mattress, 12 nos. Cost ₹ 8..33 lakhs	MT/ 2144	M/s. Vyas & Co., Asansol, P.O no.05/2012/7113/01037 dated- 24.1.2.2012.	CMS / KGH
28	GM OT / 11-12	Screw Air Compressor, 1000 cfm / Cost ₹ 27,51,785(S), 23,75,612(P)	MT/ 2138	M/s. Godrej & Boyce Mfg. Co. Ltd., Mumbai, OP-1908 dated- 03.09.2010.	Dy. CME/ Plant
29	GM OT 11-12	Remote Operated Multi- functional OT Table,	MT 2146	M/s. Janak Traders, P.O no. 05/2012/7107/00838 dt 22.11.12.	CMS / KGH



Project Items ( PH-42 ) ó 06 Nos.

Sl No	Item No. & Yr. of san.	Description & Qty.	MT No	Supplier's Name/A.T / PO no.	Consignee/ Location
30	50 Loco Project	Battery Charger set, 3 nos. Cost ₹ 6.79 lakhs	MT/ AP-050/ 046	M/s. Rayco Electro Enterprise, Kol, P.O no. 05/2009/7009/92175 dt.13.01.12.	Dy.CEE/EL
31	200 Loco Project	S.S. pipe cutting m/c.-02 nos. ₹ 7.45 lakhs.	MT/ AP- 200/ 030	M/s. Indo Tech Machines Pvt. Ltd. Indore, P.O no. 05/2007/ 7215/71895 dt.19.03.10	Dy.CME/ELA
32	200 Loco Project	Varnish Spary Booth	MT/AP 200/022	M/s. Bullows Paint Equipt. Mumbai P.O. No. 05/2007/7208/71806 dated. 24.12.08.	Dy.CEE/TMM
33	200 Loco Project	E.O.T crane, (Pendent Operated),	MT/ AP-200/ 032	M/s. Krane Mfg. (India) Pvt. Ltd.), Thane, P.O no. 05/2007/7220/ 71856 dt.11.08.2009	Dy.CEE/TMM , Bay-5A (Extension), 3-Phase Bay (VPI-III shed)
34	275 Loco Project	Auto Lister truck(10 nos), Cost ₹ 31.77 lakhs	MT/AP- 275/013	M/s. Godrej & Boycee, P.O no. 05/2012/7055/ 00881 dt. 30.11.12	Dy.CMM/ Depot
35	275 Loco Project	Induction Brazing Plant for rotor- 1 set	MT/AP- 275/04	M/s. VEL ELECTRONICS, Mumbai, PO no.05/2012/ 7056/02085 dated- 03.07.13.	Dy.CEE/TMM

## 8.8 Important M&Ps under acquisition.

xi.	Commutator Tig Welding machine.	-	Traction Motor Shop
xii.	Horizontal Boring machine	-	Heavy Machine Shop.
xiii.	Pipe Threading machine	-	Loco Assly. Shop.
xiv.	Laparoscopic Gynaecological Instrument	-	K.G.Hospital.
xv.	Video Gastroscope Colonoscope	-	K.G.Hospital.

## 8.9 Transport Shop :-

Transport Shop maintains all road vehicles consisting of passenger vehicles like cars, jeeps, mini buses etc. for movement of officials and industrial vehicles like forklifts, dumpers, tractors, platform trucks/ lists for movement of material inside and outside the shops.

Available Maintenance of Material handling equipments (as on 01.01.2014 ):-

FLT : 32 Nos.

PLT : 23 Nos.

Tractor : 02 Nos.

Truck: 06 Nos., Tripper- 03 Nos. Bus: 02 Nos.

Shunting Locos: 03 Nos.

Passenger Vehicles: 23 Nos. - Maintained through in-house and outside agencies.

## 8.10 Yard Organisation:-

For movement of traffic wagons, inward and outward departmental wagons and locomotive shell on dummy bogies, three shunting engines have been deployed. These locomotives are maintained and operated by Yard Staff. Yard Organisation also keeps liaison with the Asansol Division of E.Railway for movement of traffic wagons.

## 8.13 OVERVIEW OF STEEL FOUNDRY

Steel Foundry/CLW was set up in the year 1963 in collaboration with M/s F.H. Lloyd of United Kingdom for production of steel castings for Steam Locomotives produced in CLW/Chittaranjan.

Steel Foundry adopted state-of-the-art-technology provided by M/s Rockwell International Corporation, USA in the year 1990-91. Today Steel Foundry is independently capable of carrying out method design and developing moulding practices for any new product.

Steel Foundry/CLW has been accredited with CLASS-A FOUNDRY certificate by RDSO on 9<sup>th</sup> August 2012.

## 8.12 PRODUCT RANGE

### 8.12.1 STEEL CASTINGS:

#### Loco-items—

- Flexi coil Bogie for WAP-4 loco.
- Flexi coil Bolster for WAP-4 loco.
- Co-Co Bogie BG for WAG-5 & WDM-2 Loco.
- Suspension Tube for Hitachi TM.
- Suspension Tube for 3phase TM.
- Rotor Clamp for Hitachi TM.
- Commutator Spider for Hitachi TM.
- Centre Pivot for WAP-4 loco.
- Ballast Blocks for WAG-9 loco.

- Ballast Block for IGBT loco.
- Ballast Weights for WAG-7 loco.
- Loco Couplers for Electric loco.
- Striker Castings for Electric loco.
- $\neq$ type Couplers for Diesel loco

**Wagon Items—**

- Casnub Bogie for BOXNHL wagons
- Casnub Bolster for 22HS/BOXNHL wagons
- Casnub Side Frame 22HS/BOXNHL wagons.
- Bogie Centre Pivot Top 22HS/BOXNHL wagons
- Bogie Centre Pivot Bottom 22HS/BOXNHL wagons

**C.B.Coupler Items—**

- Knuckle for CB Coupler.
- Coupler Body for CB Coupler.
- Yoke for CB Coupler.
- Striker Castings for CB Coupler.

**Spares for Zonal Railways—**

- Suspension Tube for WDM-3D loco.
- Wheels for Tower Car.
- Wheels for Power Car
- Wheels for Narrow Gauge Coaches.
- Wheels for Narrow Gauge loco.

**8.12.2 DEVELOPMENT OF NEW STEEL CASTING ITEMS:**

**(a) DEVELOPED & SUPPLIED REQUIRED TO RAILWAYS-**

- ❖ CB Coupler for Electric Locomotives
- ❖ Striker Casting for Electric Locomotives
- ❖  $\neq$ type Coupler for Diesel loco

**(b) UNDER DEVELOPMENT-**

- ❖ Casnub Side Frame & Bolster for BLC Wagon
- ❖ GM bogie for DLW made WDG4 loco
- ❖  $\neq$ type Coupler for Diesel Loco
- ❖ Clevis for Coupler items



E-type Coupler for WDG-4 Loco

**8.12.3 FABRICATED ITEMS for LOCO:**

- Long Beam for WAP4
- End Structure for WAP4
- End Structure for WAG7
- End Box for WAG7



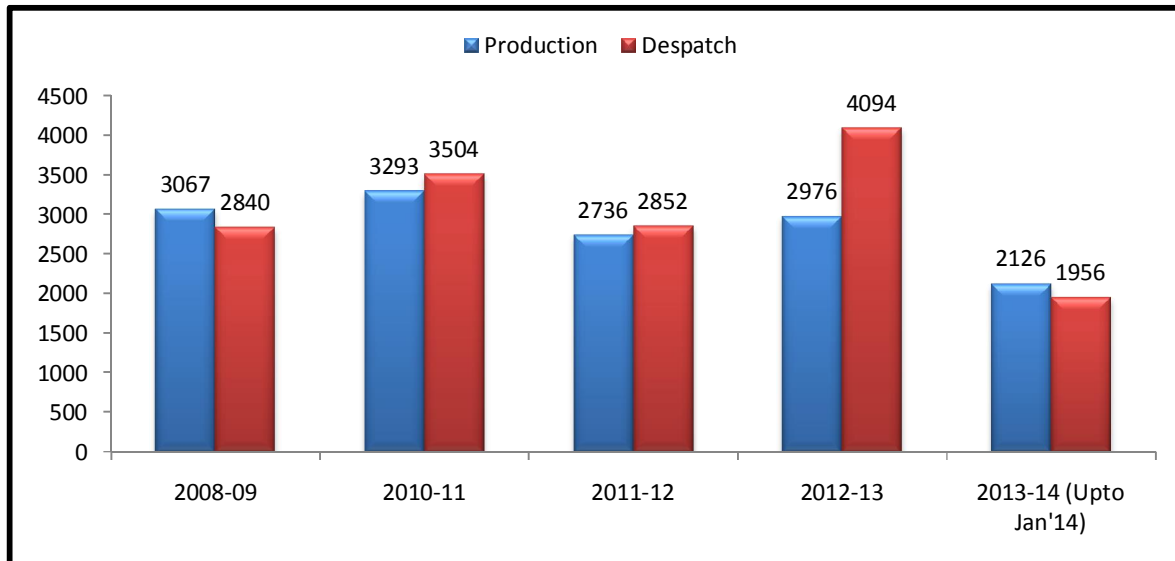
Cow Catcher

- Long Beam for WAG-7
- Roof Hatch Assembly for WAG-9/WAP-4 locos
- Head Stock for WAG-9/WAP-7 loco
- Centre Sill for WAG-9/WAP-7 loco
- Side Sill for WAG-9/WAP-7 loco
- Central Under Frame for WAG-9/WAP-7 loco
- Middle Box for WAG-7 loco

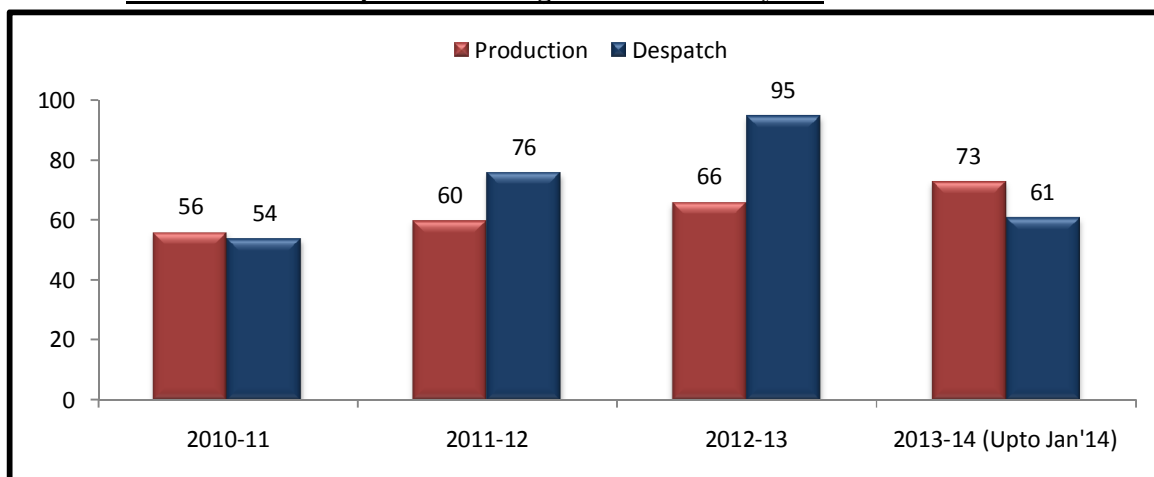


### 8.15 OUTTURN PERFORMANCE:

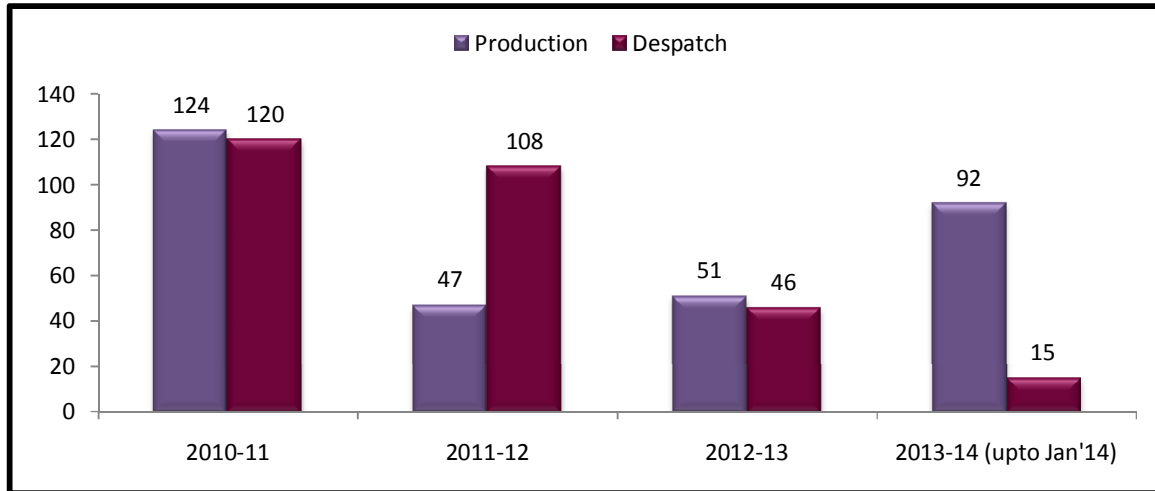
#### 8.13.1 Production & Despatch of Steel Castings over last five years



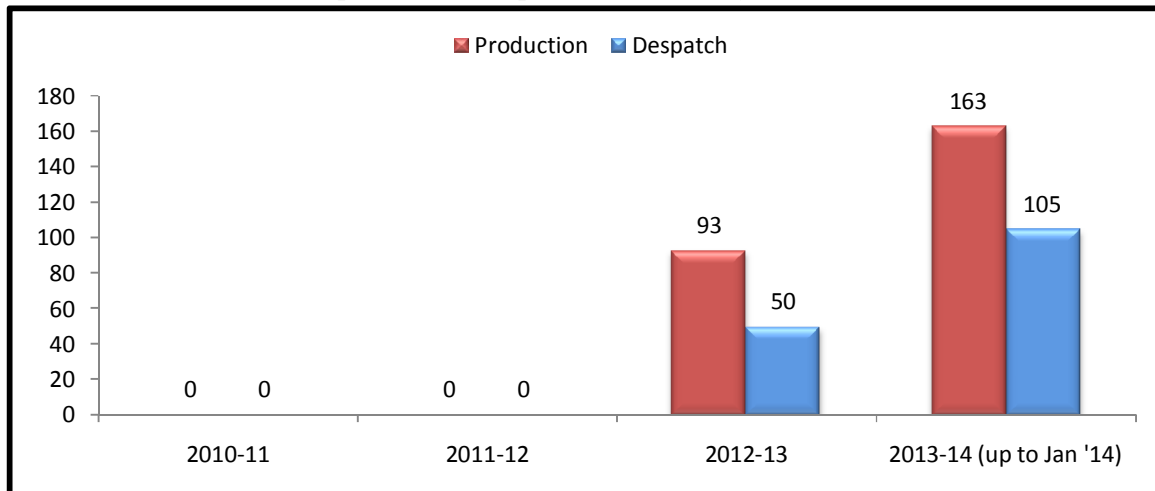
#### 8.13.2 Production and Despatch of FC Bogies over last Four years



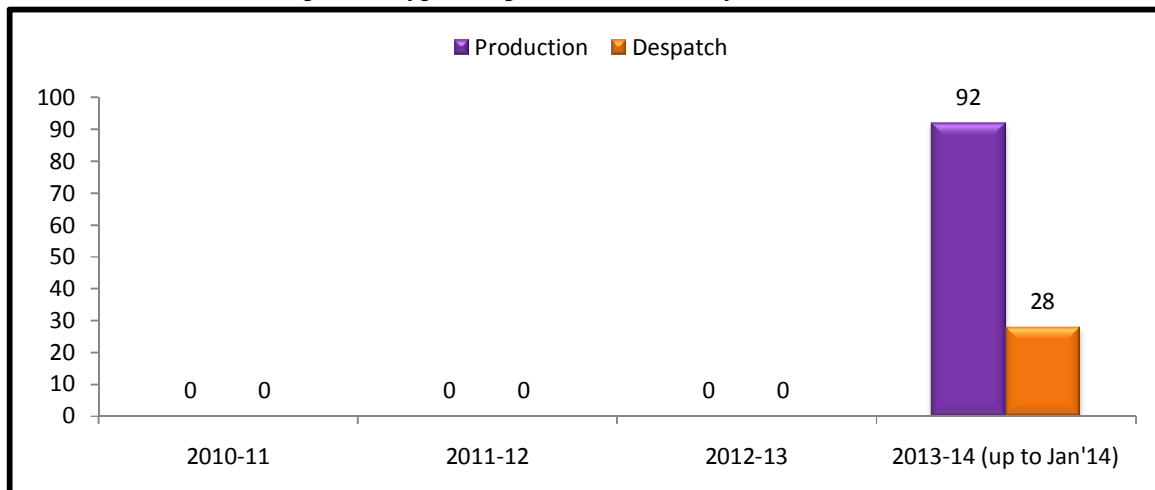
**8.13.3 Production & Desp. Of RIC Bogie Castings over last four years—**



**8.13.4 Production & Desp. Of Loco Coupler over last four years—**



**8.13.7 Production & Desp. Of E-type Coupler over last four years—**



#### 8.14 QUALITY:

Steel Foundry/CLW, despite following Green Sand moulding system, is endeavoring to contain the rejection level within 3%. Rejection percentage for the last 5 years is produced below which show that they are contained within the targeted limit.

Years	Total Cast (in MT)	Rejection (in MT)	Target	Rejection Percentage
2009-10	3529	84	3 %	2.38 %
2010-11	3362	69	3 %	2.05 %
2011-12	2736	56	3 %	2.05 %
2012-13	2976	64	3 %	2.15 %
2013-14 (up to Janø14)	2126	43	3 %	2.02 %

#### 8.14.1 QUALITY ASSURANCE MEASURES:

(a) **Switching over to Metal Patterns/Core-boxes-**

With an objective to eliminate the casting defects owing to over-aged wooden patterns/core-boxes, induction of metallic patterns/core-boxes has been introduced.

In this regard, Hitachi Suspension Tube, Knuckle, Coupler Body etc. for locos & wagons, metallic patterns and core boxes have been procured from out agencies. The quality of the relevant castings pertaining to dimension and surface finish has been improved.

(b) **Mechanization of Foundry Process—**

Steel Foundry/CLW is in the process to adopt the Synthetic Sand Moulding System to overcome the casting defects like- sand inclusion, poor surface finish, blow holes etc. being induced by the existing Green Sand Moulding Practice.

(c) **Other Steps—**

In addition, following actions are being taken to improve upon quality/reduction in rejections

- Periodical checking of patterns & core boxes on quarterly basis.
- Use of exothermic sleeves to eliminate chances of shrinkage and cavities & to increase yield.
- Use of branded Zircon based mould washes to improve surface finish.
- Use of pouring ponds and tiles of high refractoriness in metal flow areas.
- Strict control over carbon boiling during melting to avoid pouring of gassy metals.
- Use of quick lime has been introduced to bring down phosphorous content of melt.
- Strict control on heat cycle during heat treatment of castings to achieve prescribed physical properties.
- 100% load testing of Bogies & Bolsters to improve reliability in service.

(d) **Customer Feedback—**

A pro-active step to call for the quality feed-backs from the customers has been initiated. All the customers are regularly being requested to provide feed-backs on the quality of items supplied from Steel Foundry/CLW. The reports have been analysed and appropriate corrective & preventive actions have been worked out, implemented and replied. Those railways, who have not responded, are being reminded regularly. The feed-backs are providing vital inputs for improvement in the quality and reliability of our products.

**8.15PRODUCTIVITY:**

Load Lifted per Direct Worker The **Allowed Time Discharged per Direct Worker per Month** for the last 4 years has been as follows:

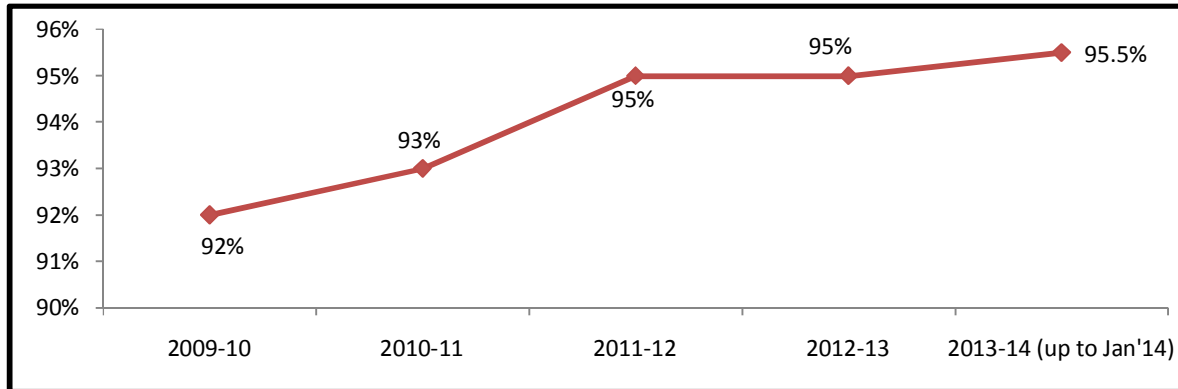
Years	2010-11	2011-12	2012-13	2013-14 (up to Jan'14)
AT Discharged	250 hrs.	246 hrs.	253 hrs.	260 hrs.

**8.16 PLANT MAINTENANCE ORGANISATION:**

Steel Foundry has total no. of 390 M&Ps. The breakdown as well preventive maintenance of all the 390 Nos. of M&Ps carried out by Plant Maintenance consisting of Millwright Section (MTS-63 Shop) & Electrical Repair Shop (ERS-64). Plant maintenance organization deals with the re-conditioning, re-engineering, retro-fitment of the machinery & plant, installation of new machinery & plants, condemnation and uprooting of old M&Ps are also carried out by these sections.

AVAILABILITY OF CRITICAL M&PS

Availability of critical M&Ps for production for the last five years is depicted below.



**Annexure IV**

**CONSOLIDATED LIST OF PENDING WARRANTY FAILURE CASES FOR CONVENTIONAL  
LOCOS (As on 31.3.13)**

Sheds	CR	ECoR	ECR	ER	NCR	NR	SCR	SECR	SER	SR	WCR	WR	Total
BSL	70												70
AQ													
ANGL		401											413
VSKP		12											
WAT													
GMO			27										39
MGS			12										
HJP													
HWH				18									28
ASN				9									
KPA				1									
CNB					31								46
JHS					15								
GZB						4							19
LDH						15							
CB													151
KZJ							34						
LGD							45						
BZA							72						
BIA								105					106
BSP								1					
BNDM									157				317
SRC									109				
TATA									51				
KGP													43
AJJ										29			
ED										14			
PER													181
ET											122		
NKJ											48		
TKD											11		
BRCY												21	21
BL													
DHD													
<b>Total</b>	<b>70</b>	<b>413</b>	<b>39</b>	<b>28</b>	<b>46</b>	<b>19</b>	<b>151</b>	<b>106</b>	<b>317</b>	<b>43</b>	<b>181</b>	<b>21</b>	<b>1434</b>



## Annexure IV contd.

## CONSOLIDATED LIST OF PENDING WARRANTY FAILURE CASES FOR 3-PHASE LOCOS (As on 31.3.13)

Sheds	CR	ECOR	ECR	ER	NCR	NR	SCR	SECR	SER	SR	WCR	WR	total
BSL	4												21
AQ	17												
ANGL													
VSKP													
WAT													
GMO			42										44
MGS													
HJP			2										
HWH													
ASN													
KPA													
CNB													
JHS													
GZB						68							
LDH													
CB													563
KZJ													
LGD							563						
SC													
BZA													
BIA								348					359
BSP								11					
BNDM													36
SRC													
TATA									36				
KGP													
AJJ													
ED													65
PER													
ET													
NKJ													
TKD										65			
BRCY													
BL													
DHD													
total	21		44			68	563	359	36		65		

9

# STAFF POSITION

## 11. STAFF BREAK UP

STAFF BREAK UP DEPARTMENT WISE Gr. C & D (AS ON 31.12.13):

DEPARTMENT	SANCTIONED STRENGTH	STAFF ON ROLL	VACANCY
<b>ACCOUNTS</b>			
GROUP 6C	502	330	172
GROUP 6D	43	58	-15
Total	545	388	157
<b>ADMINISTRATION</b>			
GROUP 6C	619	454	165
GROUP 6D	245	251	-6
Total	864	705	159
<b>CIVIL</b>			
GROUP 6C	398	266	132
GROUP 6D	494	441	53
Total	892	707	185
<b>ELECTRICAL</b>			
GROUP 6C	2774	2161	613
GROUP 6D	455	503	-48
Total	3229	2664	565
<b>MECHANICAL</b>			
GROUP 6C	5862	4952	910
GROUP 6D	1053	1019	34
Total	6915	5971	944
<b>MEDICAL</b>			
GROUP 6C	200	151	49
GROUP 6D	420	249	171
Total	620	400	220
<b>PERSONNEL</b>			
GROUP 6C	299	282	17
GROUP 6D	0	0	0
Total	299	282	17
<b>RPF</b>			
GROUP 6C	508	389	119
GROUP 6D	27	23	4
Total	535	412	123
<b>S &amp; T</b>			
GROUP 6C	41	35	6
GROUP 6D	12	14	-2
Total	53	49	4
<b>STORES</b>			
GROUP 6C	632	449	183
GROUP 6D	395	249	146
Total	1027	698	329
<b>GRAND TOTAL</b>			
<b>GROUP - C</b>	<b>11835</b>	<b>9469</b>	<b>2366</b>
<b>GROUP - D</b>	<b>3144</b>	<b>2807</b>	<b>337</b>
<b>TOTAL</b>	<b>14979</b>	<b>12276</b>	<b>2703</b>

10

# UNIT COST OF THE PRODUCT

## 10. UNIT COST OF THE PRODUCTS

(Figures in thousands of Rs.)

### i. 2010-11

Type of Loco	Direct Labour	Direct Materials	Over heads	Total(ex. Pro. Chgs.)	Pro. Charges	Total(in pro.charges)
WAP-4	42,60	4,20,38	1,39,72	6,02,70	9,04	6,11,74
WAG-7	36,15	4,50,31	1,20,44	6,06,90	9,10	6,16,00
WAG-9	55,29	11,05,36	1,92,97	13,53,62	19,63	13,73,25
WAP-7	55,29	11,32,79	1,93,10	13,81,18	20,02	14,01,20
WAP-5	55,29	11,54,61	1,93,54	14,03,44	20,35	14,23,79

### j. 2011-12

Type of Loco	Direct Labour	Direct Materials	Over heads	Total(ex. Pro. Chgs.)	Pro. Charges	Total(in pro.charges)	ED	Total (in.ED)
WAP - 4	4098	53558	11744	69400	1041	70441	700	71141
WAG-7	5001	50068	14031	69100	1036	70136	700	70836
WAG-9	5529	110536	19335	135400	1936	137363	1400	138736
WAP-7	5529	113279	19292	138100	2002	140102	1400	141502
WAP-5	5529	115461	19310	140300	2035	142335	1400	143735

### k. 2012-13

Type of Loco	Direct Labour	Direct Materials	Over heads	Total(ex. Pro. Chgs.)	Pro. Charges	Total(in pro.charges)	ED	Total (in.ED)
WAP - 4	4098	53558	11744	69400	1041	70441	1400	718411
WAG-7	5001	50068	14031	69100	1036	70136	1400	71536
WAG-9	5529	110536	19335	135400	1963	137363	2800	140163
WAP-7	5529	113279	19292	138100	2002	140102	2800	142902
WAP-5	5529	115461	19310	140300	2035	142335	2800	145135

### l. 2013 – 14 ( upto31.12.13)

Type of Loco	Direct Labour	Direct Materials	Over heads	Total(ex. Pro. Chgs.)	Pro. Charges	Total(in pro.charges)	ED	Total (including ED)
WAP-4	3914	52800	11886	68600	1029	69629	1400	71029
WAG-7	4413	51856	12331	68600	1029	69629	1400	71029
WAG-9	5642	101094	18064	124800	1810	126610	2800	129410
WAP-7	5225	104136	16039	125400	1881	127281	2800	130081
WAP-5	5310	112428	16462	134200	2013	136213	2800	139013

**11**

# **INDUSTRIAL SAFETY**

# 11. SAFETY ORGANISATION

Safety Officer & Safety Inspectors regularly check the safety aspect in the shop floor such as use of Personal Protective Equipment, proper use of Material Handling Equipment, unsafe working practices etc. They also conduct safety inspections, investigations of accidents and recommended remedial measures. They also formulate plans for motivating staff for safety consciousness, use of safety equipment and compliance of statutory act and regulations.

To monitor Occupational Health Hazards, periodical Medical Check-up is done by Medical Department as per statutory regulation. Safety department in co-ordination with Medical Department frames the programme and maintain the records of the tests. It also maintains liaison with State Pollution Control Board. Environmental Engineers of WBPCB from Asansol & Kolkata regularly visits Steel Foundry/ CLW/Chittaranjan. Safety department with the help of approved agencies of WBPCB conducts regular tests of air and sound.

## 11.1 INDUSTRIAL SAFETY:

**Accident Statistics of CLW during the last 5 years i.e 2008-09,2009-10,2010-11,2011-12,2012-13**

Sl. No.	Year	No. of Accidents	Type of injury		
			Fatal	Major	Minor
1	2009	08	02	06	-
2	2010	09	01	07	01
3	2011	06	-	06	-
4	2012	07	-	07	-
5	2013	10	01	07	02

## 11.2 Measures taken for Improvement:

**i.** All the Shops and work sides are regularly inspected for "Plant Safety Inspection". All plants using flammable substances like acetylene and LPG etc. are inspected regularly and plant maintenance/operation units follow fire proof working procedures for safe operation and maintenance of these plants. Contractors engaged for maintenance of acetylene/oxygen/LPG plants are monitored regularly by Safety Units. Fire Prevention measures - like use of Flash back arrestor in acetylene cylinder and declaration of fire prone area as "NO SMOKING ZONE", rigorous training of staff by fire inspectors, demonstration of fire- fighting equipment at the working sites, regularly re-filling/repair of fire extinguishers etc. are being followed for vulnerable zones. All the accident/dangerous occurrences are investigated and section/persons responsible are pinpointed and remedial measures taken to minimize such incidents.

**ii.** Regular checking is carried out in production shops regarding use of Personal Protective Equipment like Safety Shoes, Goggles, Helmet, Nose mask etc. Staffs are continuously motivated to wear PPEs and also apprised of the resultant hazards associated with non-use of such equipment.

**iii.** A proper vigil is regularly maintained to determine whether all critical equipments like Crane, chain, Pressure Vessel etc. are tested as per the Statutory Rules by the agencies approved by the State Inspectorate of factories. Do's and Don'ts for safe operation of crane has been circulated to concerned shops.

**iv.** Crane Drivers, Riggers, staffs engaged for Spray Painting, Electroplating, Battery Charging, Foundry work, operation and signaling to the cranes etc. are given regular medical check up to assess their vision, chest, lung function etc. in compliance with the statutory obligation.

**v.** Safety calendars, posters procured by safety deptt. are displayed at shop floor for safety awareness among the workers. As per the relevant provision of Factory Rules 1958, Safety and Health Policy of CLW has been prepared duly signed by the CME and occupier and displayed the same in various locations through laminated boards. Staff are regularly counseled by the Chief Safety Inspectors / Safety Inspectors to adopt safe practices while they are at work.

**vi.** Fume Extraction System has been installed in shop no 26. The system is effective to extract the welding fumes arising out of welding operation thus maintaining upgraded environmental standard in the shop floor as well as to prevent the workers from being afflicted with any irreversible diseases by inhalation of the fumes.

**vii.** The safety action plan pertaining to various operations being carried out inside the factory premises has been chalked out and the same has already been distributed to all stake holders to ensure strict compliance of the same to user in safe practice while performing the respective job .

**viii.** Work-shop on safety are being held in collaboration with TTC where demonstration is made by Safety Deptt. with the aid of audio-visual mode based on the video footages filmed during the working hours to admonish the staff about the various processes of un-safe act and also an inter-active session is conducted in the work-shop to en-courage participation by the workers .

**ix.** Plant Safety Audit and Work Area Monitoring have been conducted by the expert agency approved by the Inspector of Factories in different areas inside the Factory premises. The deficiencies found in course of the above work have been pointed out and the same have been brought to the notice of concerned authorities to make necessary rectification.



12

# FUTURE PLANS

## **IMPORTANT WORK PLAN DURING 2013-14**

11. One No. Universal Tensile Testing Machine, capacity 100 ton was procured through M&P (2012-13) & commissioned in Lab Loco.
12. Procurement of Vicker Hardness Tester through M&P(2012-13) under GMø's Out of Turn & P.O has placed, expected commissioning of Vicker Hardness Tester in the mid of the February 2014.
13. Procurement of Magnetic Particle Testing (MPT) Equipment through M&P(2012-13) case is under process.
14. M&C Laboratory of Main Lab Loco &SF Lab is in a project stage of computerization, upgradation of online test reporting system.
15. 500 Ton Hydraulic Pull Load Testing M/c is under procurement for high tensile CBC coupler & its components as per RDSO Specification 56BD07 & 48BD08 & E-Coupler &H-type Coupler for DLW.

13

# OTHER ISSUES

## 13 Other issues

- Up to Dec 2013, CLW has turned out 204 locos over and above against proportionate target of 203. The production of 3-phase locomotives is highest in current year. CLW has produced 106 three phase loco in current financial year upto Dec. compared to 110 in complete last financial year.
- CLW in the past has never turned out more than 8 three phase locos in any month. The capacity has been now stabilized to 14-15 per month.
- The manufacturers of three phase loco equipment have stepped up their production to meet the enhanced requirements. The assistance from Board in this regard is highly appreciated.

Chittaranjan Locomotive Works had been sanctioned "Creation of additional facilities for enhancement of production capacity up to 200 locomotives per year" at the estimated cost of Rs.92.51 Crores at first step. The major works are

- Additional Bay of Loco Fabrication Shops.
- Extension of Traction Motor Shops.
- Additional Machinery & Plant, Tools, Jigs & Fixture
- Production Control Information Management System
- Augmentation to various Ancillary Shops

The work was completed by June 2013 to enable CLW with higher productivity and step forward towards producing more 3-phase Locomotive.

The anticipated cost for augmentation capacity to achieve 275 locomotives per year in second phase is Rs.134 crores. The work is scheduled to be completed by June 2014.

- Dankuni project of CLW - Cost of the project is 270.77 Crores. The work is scheduled to be completed by June 2014.

भारतीयरेल  
INDIANRAILWAYS  
चिटरंजनरेलइंजनकारखाना  
CHITTARANJAN LOCOMOTIVE WORKS



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सं जी एम डाल्यू 137 भाग XXI

No. GM/W/137 Pt. XXI

Date: .07.2014.

प्रदेशक यांक इं (उ इ) Director Mech. Engg. (PU)

रेलवे बोर्ड Railway Board

रेल मंत्रालय Ministry of Railways,

कमरा सं 322/बी Room No.322/B,

नई दिल्ली New Delhi-110001 .

विषय: उत्पादन ईकाई का स्टैंडर्डनोट , प्रेरका 01.01.14 तक ।

Sub: Standard note for Production Unit, CLW as on 01.01.2014.

संदर्भ बोर्डका दनांक 20.5.2014 का प सं 2014/एम(पी यू)/4/1 ।

Ref: Board's letter no. 2014/M (PU)/4/1 dt.20.5.14.

स्टैंडर्डनोट 01.1.2014 तक का बीस प्रतियां प्रेषित का जा रहा है। 31.03.2014 तक का स्टैंडर्डनोट शीघ्र भेजा जा रहा है।

Twenty copies of the Standard note as on 01.01.2014 is being sent herewith. The updated position of the Standard Note as on 31<sup>st</sup> March, -2014 will be sent shortly.

DA: As above.

उप महाबंघक  
Dy. General Manager

