EASTERN RAILWAY

WORK STUDY REPORT

ON

REVIEW OF WORKLOAD VIS-À-VIS STAFF STRENGTH OF TOOL ROOM AT LILUAH WORKSHOP

(STUDY NO. WSER - 14 /19-20)

(Submitted on 24.12.2019)

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BY

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CONTENTS

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The study team hereby acknowledges its deep gratitude to Chief Works Manager/ Liluah for allowing the study team to conduct the study.

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The study team is also very thankful to Senior Section Engineer, Junior Engineer and other staff of Tool Room for providing necessary information in connection with the subject study.

METHODOLOGY ADOPTED

The following methodology has been adopted in carrying out the study:

- Collection of data
- Discussion with concerned officers and Supervisors of Tool Room
- Study of existing workload
- Critical analysis of workload and manpower

TERMS OF REFERENCE

The subject work study has been undertaken by the GM's Efficiency Cell during the current financial year 2019-20 as per recommendation done vide CWE's L.No. LG.86/Misc./Pt.III dtd. 29/05/19 with the following terms of references:

(i) Evaluate the quantum of existing workload.

(ii) Examine the deployment of Staff against workload.

(iii) To identify saving achievable in terms of manpower.

SUMMARY OF RECOMMENDATION

Sl. No.	***Recommendations***	***Para reference***
1	It is recommended that the Revised total requirement of Artisan & Helper to carry out the entire departmental workload presently catered by Tool Room's staff will be 99 posts which would result in surrender of **20 posts** as against the present total sanctioned strength of 119 posts.	*3.16*
2	It is recommended to transfer Tool Room's staff working at Coach Furnishing Shop, PCO, L-shop and G-shop to their respective shop of working so that supervision of these staff can be done in a better way.	

EXECUTIVE SUMMARY

Study Name & No.:	"REVIEW OF WORKLOAD VIS-A-VIS STAFF STRENGTH OF TOOL ROOM AT LILUAH WORKSHOP" ***(STUDY NO.WSER 14/19-20)***
Year of conducting the study:	**2019-20**
Terms of reference:	(i) Evaluate the quantum of existing workload. (ii) Examine the deployment of Staff against workload. (iii) To identify saving achievable in terms of manpower.
Methodology:	• Collection of data • Discussion with concerned officers and Supervisors of Tool Room • Study of existing workload • Critical analysis of workload and manpower.
Existing Sanctioned Strength *(Artisan staff Helper category staff only)*	***119***
Existing Men on Roll *(Artisan staff Helper category staff only)*	***75***
Vacant post	***44***
Revised Requirement	***99***
Proposed Surrender	**20**

Justification
For assessment of Revised requirement of manpower in Tool Room at Liluah workshop, study team analyzes the effective utilization of manpower vis-a- vis assessment of Monthly Production. The review of manpower of Tool Room at Liluah workshop is assessed considering the outturn of the shop for the year 2017-18 and 2018-19. For assessment, study team takes reference from *Chapter IV of 'Indian Railway Mechanical Code'* regarding various aspects of "**Production Control Organization"** to analyze in a more scientific way.

CHAPTER-I

1.0 ***INTRODUCTION:***

Indian Railways is the life-line of nation for providing Transportation facility over the length and breadth of the country. Its vision is to provide efficient, affordable, customer-focused, environmentally sustainable integrated transportation solutions and to be the vehicle of inclusive growth, connecting regions, communities, ports and centres of industry, commerce, tourism and pilgrimage across the country.

1.1 Indian Railways manufactures much of its rolling stock and heavy engineering components at its six manufacturing plants, called Production Units, which are managed directly by the Ministry. Popular rolling stock builders such as CLW and DLW for electric and diesel locomotives; ICF and RCF for passenger coaches are Production Units of Indian Railways. Over the years, Indian Railways has not only achieved self-sufficiency in production of rolling stock in the country but also exported rolling stock to other countries. Each of these production units is headed by a General Manager, who also reports directly to the Railway Board. Thus, Indian Railways manages and maintains all those infrastructures. Management of those huge infrastructures have to be done in accordance with the organization's vision.

1.2 Besides the above, in Indian Railways, various Railway Workshops plays a very vital Role in connection with POH/ROH/IOH/NPOH repair of different kinds of Wagons, coaches *(both AC & Non-AC)* and Locomotives *(both Diesel & Electric)*.

1.3 To cope up with the above changing scenario, Infrastructural development is not only required in the area of manufacturing & periodical overhauling of various types of passenger coaches, goods wagons and Diesel/Electric Locomotives only, overall infrastructural development is necessary in whole Indian Railway system.

1.4 For any kind of development, money is the most important but limited resources. An organisation, like Indian Railways, may also provide a good financial support for its development, if good financial discipline can be practiced and expenditure due to man, materials & overheads can be managed optimally & economically.

1.5 In view of the above, Rly. Board issued nos. of circulars, orders, etc. The Zonal Railways also implement various measures for financial discipline.

1.6 At this juncture, the role of Railway Efficiency & Research Directorate is also very important in connection with 'Benchmarking', 'Rationalising of Man-Power', etc.

1.7 Indian Railway is facing tremendous financial crunch after implementation of 6th Pay Commission. Operating ratio is gradually increasing. Though Indian Railway is not a business organization but to survive, it is always essential to make the organization in profit i.e. operating ratio should be less than 1. Performance Efficiency Index shown in the corporate plan published by the Eastern Railway is given below.

2013-14	:	173.32%
2014-15	:	177.27%
2015-16	:	180.75%
2016-17	:	165.25%
2017-18	:	181.15%

1.8 The aim of conducting this Workstudy is to review the manpower of Tool Room (TR-Shop) of Liluah Workshop for optimization. In the analysis, the effective utilization of human resource is considered keeping in mind of the present working pattern. The objective is to explore financial savings of the Railways.

CHAPTER-II

2.0 Existing Scenerio:

In Eastern Railway, there are three major Workshops for POH/ROH/IOH/NPOH and repair of different kinds of Wagons, coaches *(both AC & Non-AC)* and Locomotives *(both Diesel & Electric)*. These Workshops are as follows-

(I) Liluah Carriage & Wagon Workshop/Liluah/E.Rly.

(II) Kanchrapara Carriage & Wagon Workshop & Kanchrapara Locomotive Workshop/ Kanchrapara/E.Rly.

(III) Jamalpur Locomotive Workshop/Jamalpur/E.Rly.

2.1 Liluah Carriage & Wagon Workshop *(An ISO-9001:2008 & ISO-14001-2004 Certified Organisation)* is one of the IR's oldest & biggest Railway Carriage & repair Workshop of India. The Liluah Workshop is functioning under Chief Workshop Manager.

2.2 The Workshop is engaged in Periodical Overhauling of all kinds of coaches & wagons. It also facilitates repair and overhauling of coach & wagon components. The above mentioned activities are performed in different shops.

2.2.1 Different shops or workpoints along with their respective activities of LLH Workshop are as under:

S.No.	***Shops***	***Activities catered by the shops***
1	M	Coaching Repair Shops
2	CR	
3	MR	
4	N	Paint Shop
5	T	Trimming Shop
6	L	Wagon Repair Shop
7	J	Sheet metal works, shearing, bending, drilling, punching, pressing work, etc
8	A	Blacksmith
9	C	Tin smith
10	E	Spring shop
11	G	Machine shop
12	HT	Heat treatment
13	K	Wheel shop
14	TR	Tool room
15	H	Mill Wright

2.3 The Tool Room of Liluah Workshop is mainly associated with the following workload:

i) Manufacturing, repairing, storing and issuance of Tools and Gauges to various shops.

ii) Calibration of various Gauges and, measuring instruments.

iii) Repair and overhauling of Pneumatic Equipments.

iv) Die repairing and setting.

v) Machining work of various types of items, etc.

2.4 The total workload of Tool Room in accordance to their nature of activities is divided among 11 sections mentioned underneath:

i) Machine Section
ii) General Fitting Section
iii) Grinding Section
iv) Tool Equipment Section
v) Die-Sinking Section
vi) Coaching Section
vii) EIW Section
viii) Die-Setting Section
ix) Pneumatic Section
x) Calibration Section
xi) Store

2.5 The existing position of Supervisory, Artisan and Erstwhile Group-D category staff of Tool Room as on 09.07.19 are mentioned underneath *(ANNEXURE I)*.

2.5.1 The category-wise Sanctioned strength vis-à-vis On-roll position of Supervisors of Tool Room is tabulated as under:

S. No	**Category**	**Sanctioned Strength**	**On-Roll Strength**	**Vacancy**
1	Sr. Section Engineer	6	6	0
2	Junior Engineer	3	0	3
Total		***9***	**6**	**3**

2.5.2 The category-wise Sanctioned strength vis-à-vis On-roll position of Artisan and Erstwhile Gr. D staff of Tool Room/LLH Workshop *(as on 09.07.19)* is tabulated underneath:

S. No	Category	Sanctioned Strength	On-Roll Strength	Vacancy
	Artisan			
1	Sr. Tech.	28	28	0
2	Technician I	54	33	21
3	Technician II	08	13	-5
4	Technician III	16	3	13
Sub-Total		***106***	***77***	***29***
	Erstwhile Group-D			
5	Helper	13	2	11
6	Peon	1	1	0
7	Safaiwala	1	0	1
Sub-Total		***15***	***3***	***12***
Grand Total		**121**	**80**	**41**

2.6 The subject study is carried out to review the manpower of Tool Room directly or indirectly involve with the workload of Tool Room. The category-wise position of Supervisors, Artisan and Erstwhile Group-D staff are shown in paras 2.5.1 and 2.5.2.

From the total position of Artisan and Erstwhile Group-D category staff, Peon and Safaiwala category staff are not directly related with shop's assigned workload and have no contribution towards shop's outturn. So, study team kept the category of Peon and Safaiwala out of the purview of the study. Also, Supervisory category is not considered in the assessment as their work is to supervise the sectional staff and they did not directly carry out the sectional work.

2.6.1 So, from above discussion, the category-wise position of staff considered during the assessment is tabulated as under:

S. No.	Category	Sanctioned Strength	On-Roll Strength	Vacancy
Artisan Category Staff				
1	Sr. Tech.	28	28	0
2	Technician I	54	33	21
3	Technician II	08	13	-5
4	Technician III	16	3	13
Erstwhile Group 'D' Category Staff				
5	Helper	13	*2*	***11***
Total		***119***	***79***	***40***

2.7 During conducting the study, it has been observed that there were 75 Men-on-roll Artisan and Helper category staff present in Tool Room *(as on Sept'19)*. Therefore, for assessment, study team considers Sanctioned Strength of 119 posts [*para 2.6.1 (supplied by Personnel Dept)*] and Men-On-Roll of 75 staff *(supplied by Tool Room shop)*.

It is also observed that out of total 75 On-roll Artisan and Helper category staff of Tool Room, 16 staff work in other shops and utilized to cater other shop's workload. Only, 59 staff are deployed for contributing Tool Room's outturn. However, out of these 59 staff , 12 staff are deployed in Coaching furnishing shop for repairing work of coaching seats, but there outturn is included in Tool Room's outturn.

The summarized position of deployment of staff of Tool Room is shown below *(ANNEXURE II).*

Category	***Sanctioned Strength***	***On-Roll Strength***		***Vacancy***
		Working for contributing Tool Room's Outturn	***Working for contributing other shop's outturn***	
Artisan staff & Helper	119	59	16	44
Total	**119**	**75**		**44**

2.7.1 The section-wise deployment of Artisan staff and Erstwhile Group-D staff *(only helper category staff)* is tabulated as under:

S. No.	***Sections***	***Sanctioned Strength***	***Existing Deployment***	***Remarks***
			<u>Deployment of staff for catering workload related to Tool Room's Outturn</u>	
1.	Machine Section	***119***	14	*Direct Workers (DW) contributing towards outturn of Tool Room*
2.	General Fitting Section		5	
3.	Grinding Section		5	
4.	Tool Equipment Section		2	
5.	Die-sinking Section		3	
6.	Coaching Section		9	*DW staff of Coaching Section are deployed at Coaching Furnishing Shop for seat repairing work*
7.	EIW Section		3	*EIW staff for material handling at Tool Room and misc. work*
			3	*EIW staff for carrying sets and berths of C-Shop*
8.	Die setting Section		3	*Staff of Tool Room working as Essential Indirect workers (EIW) at A-Shop and J-shop*
9.	Pneumatic Section		3	*Staff of Tool Room working as Essential Indirect workers (EIW) at L-shop, C-Shop & G-Shop*
10.	Calibration Section		5	*Staff from Tool Equipment Section and General Fitting Section are deployed*
11.	Store		4	
Total Staff at Tool Room			**59**	
			<u>Deployment of staff for catering workload of other shops and has no contribution towards Tool Room's Outturn</u>	
12.	Working at PCO		9	--
13.	Working at L-shop		4	--
14.	Working at G shop		3	--
Total staff of Tool Room working in other shops			***16***	
Grand Total		**119**	**75**	

2.8 The workload carried out by the various sections of Tool Room is mentioned in details in paragraphs below:

2.8.1 ***Machine Section:***

Machine section is the among the most important part of the Tool Room where all the machining work regarding manufacturing and repair of gauges, tools, jigs & fixtures are carried out. The workload in regard to repair and manufacturing of gauges, tools, jigs & fixtures are as under:

S. No.	***Nature of Work***	***Monthly outturn*** *(approx)*
1.	Snap Gauge	As per order
2.	Plug Gauge	As per order
3.	Gap Gauge, wheel distance gauge	As per order
4.	Jig for loading & unloading of engine & alternator of power car	As per order
5.	Different jigs and fixtures arrangements, gauges as per requirement	As per order
6.	Model parts machining	As per order

Other than the above mentioned workload, machining of several items from various shops are also carried out in this shop. The list of some items the machining of which are done in regular manner are mentioned below:

S. No.	***Nature of Work***	***Monthly outturn (approx)***
1.	Tube for Anti-roll bar of LHB bogie (Budge Budge)	100
2.	Tube for primary stop of LHB bogie (Budge Budge)	200
3.	Modified CBC restrictor	20
4.	Stopper plate (MR/LB)	100
5.	Catch arrangement (MR/Rep Bay)	100
6.	Spigot (L-shop)	100
7.	Centre Pivot (L-shop)	40
8.	Screwing piece (MR/ SCR)	100
9.	Pipe threading of MR-Raj, MR- Pipe & MR-Air Brake	700
10.	DV and CPB repair (L-Air Brake)	5
11.	Rethreading of bottom cover (L-Air Brake)	50
12.	Test Plate for welding at BTC	50
13.	Different specimen cutting or machining for testing at CMT	60

The machine shop of Tool Room is the only place in Liluah Workshop where various types of machines are available. So, apart from the above mentioned workload, lots of other miscellaneous and non-schedule work are also carried out by this section.

Staff of Machine section are deployed in 2 shifts (*i.e General shift and B-shift*) to cater the above mentioned workload. Existing deployment of staff of this section is shown below:

Shift	***Nos. of staff deployed***
General shift	10
B-shift	4
Total	**14**

The Machinery and Plant in working condition present in Machine shop are as under:

Sl. No.	***Description of machine***	***Quantity***
1.	Lathe machine	5 nos.
2.	Milling machine	7 nos.
3.	Shaping machine	2 nos.
4.	Planning machine	1 no.
5.	Sawing machine	1 no.
6.	Drilling machine	2 nos.
Total		**18 os.**

2.8.2 ***General Fitting Section:***

General fitting and assembly work of gauges, jigs, fixtures and other misc. jobs are done by the staff of this section. The workload carried out by the staff of this section is listed below:

a) Marking, assembly, filing of the jobs after machining work is done.
b) Gauges, fixtures, jigs manufacturing and repair.
c) Manual engraving.
d) Die repair.
e) Model parts making for machining & filing.

Existing deployment of staff of General fitting section is as under:

Shift	***Nos. of staff deployed***
General shift	5
Total	**5**

2.8.3 ***Grinding Section :***

The workload carried out by the staff of Grinding section in regular manner is listed below:

a) Sharpening of different types of tools of Tool room and other shops.
b) Grinding of Die & punch for repair work.
c) Cutting of different parts by abrasive cutter.

Staff of this Grinding Section also are deployed in 2 shifts (*i.e General shift and B-shift*) to cater the above mentioned workload. Existing deployment of staff of this section is shown underneath:

Shift	***Nos. of staff deployed***
General shift	4
B-shift	1
Total	**5**

The Machinery and Plant in working condition present in Grinding Section are as under:

Sl. No.	***Description of machine***	***Quantity***
1.	Grinding machine	7 nos.
Total		**7 nos.**

2.8.4 ***Tool Equipment Section:***

Tool Equipment section generally deals with workload of precision work. The workload carried out by the staff of Tool Equipment section is listed below:

a) Model assembly.
b) Making of Cutting tools, special tools, form tools, etc.
c) DV, Semi-automatic lock, Chuck repair, etc.

Existing deployment of staff of Tool Equipment section is shown underneath:

Shift	***Nos. of staff deployed***
General shift	2
Total	**2**

2.8.5 ***Die-sinking Section:***

The workload carried out by the staff of Die-sinking section is listed below:

a) Catch arrangement fitting.
b) Angle Cock repair.
c) Front and Rear axle cover cutting, etc.

Existing deployment of staff of Die-sinking section is shown underneath:

Shift	***Nos. of staff deployed***
General shift	3
Total	**3**

2.8.6 ***Coaching Section:***

Staff from Grinding Section and Die-sinking section are deputed in this section. The staff of Coaching section carry out seat repair work and repair of broken frame at Coach furnishing shop. The workload carried out by the staff of Coaching section is listed below in details:

a) Striping and fitting of seats & berths of GSLR,GSLRD and GS coaches.
b) Repair of broken frame.

Existing deployment of staff of Coaching section is shown underneath:

Shift	***Nos. of staff deployed***
General shift	9
Total	**9**

2.8.7 ***EIW Section:***

This section consists of 6 nos. EIW staff of Tool Room. Out of 6 EIW staff, 3 staff are deputed at Tool Room and rest 3 staff are deputed along with staff of Coaching section for seat repairing work at Coach furnishing shop. The deployment of staff of EIW section along with the details of workload catered by them are shown underneath.

Shift	***Nos. of staff deployed***	***Description of Workload***
General shift	3	Deployed at Tool Room for material handling, housekeeping and other miscellaneous work.
	3	Deployed along with DW staff of Coaching section for carrying seats & berths from stripped coaches to C-shop for upholstery and also provide ready material from store to coaches for fitting work.
Total	**6**	

2.8.8 ***Die-setting Section:***

The staff of Die-setting section are EIW staff of Tool Room and carry out die setting work at A-shop and J-shop.

Existing deployment of staff of Die-setting section is shown underneath:

Shift	***Nos. of staff deployed***
General shift	3
Total	**3**

2.8.9 ***Pneumatic Section:***

The staff of Pneumatic section are EIW staff of Tool Room and carry out maintenance work of Pneumatic hand tools used by L-shop, C-shop and G-shop.

Existing deployment of staff of Pneumatic Section is shown underneath:

Shift	***Nos. of staff deployed***
General shift	3
Total	**3**

2.8.10 ***Calibration Section:***

Calibration of measuring instruments and gauges is one of the most vital work of Tool Room. The staff of Calibration section carry out the calibration work of gauges and instruments of different shops of Liluah workshop and other places over Eastern Railway.
The workload carried out by the staff of Calibration section in regular manner is listed below in details:

a) Calibration and repair of around 2500 nos. of gauges and instruments of Liluah workshops and units all over from Eastern Railway with an interval of every 6 months.
b) Monitoring and maintaining record of all the Calibrations done by the Section.
c) Monitoring and maintaining record of all the Calibrations of Master Gauges and Instruments done by outside agencies.

The deployment of staff of Calibration Section is shown underneath:

Shift	***Nos. of staff deployed***
General shift	5
Total	**5**

2.8.11 ***Tool Room Store:***

This section is serving one of the most vital function of Tool Room i.e storing and issuance of Tools and instruments. The workload carried out by the staff of Tool Equipment section is listed below:

a) Issuance of tools and instruments.
b) Arrange for repair of tools and instruments.
c) Accounting with record keeping of tools and instruments.
d) Identification of damaged tools and process for scraping.

Staff at Tool Room Store are deployed in 2 shifts *(i.e General shift and B-shift)*. Existing deployment of staff of this section is as under:

Shift	***Nos. of staff deployed***	
General shift	Tool main Godown - 2 Tool Issue Counter - 1	3
B-shift	Tool Issue Counter -	1
Total	**4**	

2.9 The description of workload of various sections are mentioned in details in above paras.

Now, among the above mentioned sections, it is noticed that the there are only 5 sections which are under incentive scheme i.e Machine Section, General fitting section, Grinding section, Tool Equipment Section and Die sinking section. These sections consists of all DW staff. The staff of EIW section are EIW staff of these sections and depend on the outturn of these 5 sections.

It has been already mentioned that staff of Coaching Section are from Grinding Section and Die-sinking and their outturn are included in the outturn of these two sections.

As far as other sections of Tool Room are concerned, the staff of Die-setting section and Pneumatic section are EIW staff of other shops and their outturn are dependent on the outturn of respective shops.

Store and Calibration section are under non-incentive scheme.

So from the discussions done in above paras, it can be concluded that the total outturn of the Tool Room are outturn contributed by the 5 sections with incentive schemes.

The monthly Allowed time attained by Tool Room is combined Allowed time of these 5 sections.

2.10 The section-wise vis-à-vis month-wise Allowed time and Time Taken of Tool Room for the Year 2017-18 and 2018-19 are shown in tables below.

2.10.1 *For the Year 2017-18:*

S.No.	***Sections***	***April'17***			***May'17***			***June'17***		
		Allowed Time	***Time Taken***	***Time Saved***	***Allowed Time***	***Time Taken***	***Time Saved***	***Allowed Time***	***Time Taken***	***Time Saved***
1	Grinding Section	2728.53	1899.50	829.03	3337.31	2337.50	999.81	3048.10	2129.00	919.10
2	Die-sinking Section	1671.20	1155.00	516.20	2020.05	1397.50	622.55	2088.31	1452.50	635.81
3	Machine Section	2569.55	1765.00	804.55	3225.28	2212.50	1012.78	2632.40	1805.00	827.40
4	General Fitting Sec	2809.18	1934.00	875.18	2962.32	2121.50	840.82	2544.24	1762.50	781.74
5	Tool Equipment Sec	1636.54	1182.50	454.04	1514.18	1087.50	426.68	1457.36	1047.50	409.86
TOTAL		**11415.00**	**7936.00**	**3479.00**	**13059.14**	**9156.50**	**3902.64**	**11770.41**	**8196.50**	**3573.91**
Total Working hours in the Month		**162.5**			**187.5**			**177.5**		

S. No.	Sections	July'17			Aug'17			Sept'17		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	Grinding Section	3120.23	2149.00	971.23	3389.18	2378.00	1011.18	2924.77	2043.00	881.77
2	Die-sinking Section	2148.83	1497.50	651.33	2136.21	1525.00	611.21	1885.34	1322.50	562.84
3	Machine Section	3050.68	2090.00	960.68	3154.32	2155.00	999.32	2909.10	2007.50	901.60
4	General Fitting Sec	2665.88	1849.50	816.38	3008.30	2062.50	945.80	2515.77	1760.00	755.77
5	Tool Equipment Sec	1685.19	1197.50	487.69	1654.48	1185.00	469.48	1354.93	972.50	382.43
TOTAL		**12670.81**	**8783.50**	**3887.31**	**13342.49**	**9305.50**	**4036.99**	**11589.91**	**8105.50**	**3484.41**
Total Working hours in the Month		**182.5**			**187.5**			**155**		

S. No.	Sections	Oct'17			Nov'17			Dec'17		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	Grinding Section	2551.05	1767.00	784.05	2926.29	2027.50	898.79	2754.71	1934.00	820.71
2	Die-sinking Section	1882.42	1300.00	582.42	1962.29	1377.50	584.79	1777.52	1275.00	502.52
3	Machine Section	2790.60	1985.00	805.60	3210.83	2265.00	945.83	2935.06	2068.50	866.56
4	General Fitting Sec	2351.75	1635.00	716.75	2750.19	1922.50	827.69	2434.29	1667.50	766.79
5	Tool Equipment Sec	1364.81	985.00	379.81	1427.31	1027.50	399.81	1465.42	1050.00	415.42
TOTAL		**10940.63**	**7672.00**	**3268.63**	**12276.91**	**8620.00**	**3656.91**	**11367.00**	**7995.00**	**3372.00**
Total Working hours in the Month		**160**			**180**			**177.5**		

S. No.	Sections	Jan'18			Feb'18			Mar'18		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	Grinding Section	2970.86	2043.00	927.86	3014.28	2113.50	900.78	3123.48	2157.00	966.48
2	Die-sinking Section	1971.75	1381.50	590.25	1877.66	1335.00	542.66	1910.83	1400.00	510.83
3	Machine Section	2890.84	2047.50	843.34	2843.08	2012.50	830.58	3093.08	2240.00	853.08
4	General Fitting Sec	2710.22	1890.00	820.22	2587.41	1845.00	742.41	2479.91	1764.00	715.91
5	Tool Equipment Sec	1465.05	1055.00	410.05	1515.56	1085.50	430.06	1676.14	1201.50	474.64
TOTAL		**12008.72**	**8417.00**	**3591.72**	**11837.99**	**8391.50**	**3446.49**	**12283.44**	**8762.50**	**3520.94**
Total Working hours in the Month		**172.5**			**170**			**185**		

2.10.2 *For the Year 2018-19:*

S. No.	Sections	April'18			May'18			June'18		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	Grinding Section	2789.41	1929.50	859.91	2617.38	1775.80	841.58	2335.00	1650.00	685.00
2	Die-sinking Section	1914.73	1320.00	594.73	1490.76	1035.00	455.76	1246.00	895.00	351.00
3	Machine Section	2790.82	1983.50	807.32	3875.80	2731.00	1144.80	3479.00	2513.00	966.00
4	General Fitting Sec	2455.70	1690.00	765.70	1941.42	1357.50	583.92	1720.00	1256.00	464.00
5	Tool Equipment Sec	1440.02	1047.50	392.52	1588.49	1185.00	403.49	1420.00	1048.00	372.00
TOTAL		**11390.68**	**7970.50**	**3420.18**	**11513.85**	**8084.30**	**3429.55**	**10200.00**	**7362.00**	**2838.00**
Total Working hours in the Month		**165**			**187.5**			**177.5**		

S. No.	Sections	July'18			Aug-18			September'18		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	Grinding Section	2565.00	1757.00	808.00	2551.00	1762.00	789.00	2443.00	1659.00	784.00
2	Die-sinking Section	1411.00	978.00	433.00	1450.00	985.00	465.00	1417.00	960.00	457.00
3	Machine Section	3560.00	2541.00	1019.00	3633.00	2608.00	1025.00	3147.00	2245.00	902.00
4	General Fitting Sec	2036.00	1423.00	613.00	2039.00	1408.00	631.00	1778.00	1243.00	535.00
5	Tool Equipment Sec	1544.00	1093.00	451.00	1619.00	1130.00	489.00	1508.00	1075.00	433.00
TOTAL		**11116.00**	**7792.00**	**3324.00**	**11292.00**	**7893.00**	**3399.00**	**10293.00**	**7182.00**	**3111.00**
Total Working hours in the Month		**185**			**185**			**170**		

S. No.	Sections	October'18			November'18			December'18		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	Grinding Section	2011.00	1367.00	644.00	2604.00	1760.00	844.00	2859.00	1947.00	912.00
2	Die-sinking Section	1149.00	795.00	354.00	1499.00	1033.00	466.00	1329.00	903.00	426.00
3	Machine Section	2869.00	2040.00	829.00	3022.00	2151.00	871.00	3174.00	2250.00	924.00
4	General Fitting Sec	1480.00	1028.00	452.00	1614.00	1105.00	509.00	1559.00	1071.00	488.00
5	Tool Equipment Sec	1374.00	963.00	411.00	1385.00	993.00	392.00	1274.00	910.00	364.00
TOTAL		**8883.00**	**6193.00**	**2690.00**	**10124.00**	**7042.00**	**3082.00**	**10195.00**	**7081.00**	**3114.00**
Total Working hours in the Month		**152.5**			**167.5**			**177.5**		

S. No.	Sections	January'19			February'19			March'19		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	Grinding Section	3308.00	2357.00	951.00	2745.00	1904.00	841.00	2849.00	1988.00	861.00
2	Die-sinking Section	1880.00	1333.00	547.00	1789.00	1243.00	546.00	1865.00	1286.00	579.00
3	Machine Section	3139.00	2296.00	843.00	2892.00	2014.00	878.00	2816.00	1967.00	849.00
4	General Fitting Sec	1653.00	1153.00	500.00	1568.00	1098.00	470.00	1431.00	998.00	433.00
5	Tool Equipment Sec	941.00	690.00	251.00	1235.00	908.00	327.00	1282.00	933.00	349.00
TOTAL		**10921.00**	**7829.00**	**3092.00**	**10229.00**	**7167.00**	**3062.00**	**10243.00**	**7172.00**	**3071.00**
Total Working hours in the Month		**180**			**170**			**172.5**		

CHAPTER-III

3.0 *CRITICAL ANALYSIS*

The subject work study has been conducted to review the manpower deployed in Tool Room (TR-Shop) of Liluah Workshop under the control of Production Engineer and overall control of CWM/Liluah.

3.1 Keeping in view of the present financial condition of Railways and the increasing trend of operating ratio of Eastern Railway, the subject study is conducted with the objective to explore the ways to attain financial savings of the Railways by right sizing human resources along with the motive to improve the effective utilization of staff.

3.2 It has been mentioned in para 2.6, that study team is considering only Artisan and Helper Category staff for assessment. So, from para 2.5.2, 2.6 and 2.6.1, the category-wise position of Artisan and Helper category staff under the purview of study is tabulated underneath.

S. No.	**Category**	**Sanctioned Strength**	**On-Roll Strength**		**Vacancy**
			Working in Tool Room	**Working in other shop**	
Artisan Category Staff					
1	Sr. Tech.	28	59	16	44
2	Technician I	54			
3	Technician II	08			
4	Technician III	16			
Erstwhile Group 'D' Category Staff					
5	Helper	13			
Total		***119***	***75***		***44***

3.3 The revised requirement of staff for Tool Room has been assessed in ongoing paragraphs through analysis of various datas in regards to shop's workload and outturn mentioned in details in Chapter II.

For assessment, study team takes reference from *Chapter IV of 'Indian Railway Mechanical Code'* regarding various aspects of "**Production Control Organization"** keeping the infrastructural setup of concerned shop of Liluah Workshop in view. The related aspects considered in the present work study are:

Originally this scheme was introduced in the Railway Repair Workshops of the Mechanical Department and the same is extended to Signal & Telecommunication workshops, Civil Engineering Workshops and the Electrical Sections attached to the Mechanical Workshops. This incentive scheme is also known as "the system of payment by results." The incentive workers are classified as Direct, Essential Indirect and Indirect Workers:

(a) ***Direct workers (DW)*** *are those engaged in work which can be assessed through time studies.*

(b) ***Essential Indirect workers (EIW)*** *are those who contributed to the continuity of the work and whose services are essential but whose work cannot be assessed through time studies.*

(c) ***Indirect Workers (IW)*** *are those who are provided for cleaning etc. do not contribute directly or indirectly to production and do not earn any incentive bonus.*

Allowed Time: *The total of the normalized time arrived from time study and all the allowances stated is termed as "allowed time"'. The allowed time as issued by the Rate Fixing Department with the approval of Production Engineer, is the time within which a worker shall complete an operation and earn bonus. It is expected that the average worker will complete an operation in 75% of the allowed time when he will earn 33 ⅓ % bonus.*

3.3.1 During analysis, study team also takes the reference of *percentage of EIW staff* for different activities as per *IR Mechanical code* as tabulated below, for calculating EIW staff:

Name of the sub-shop	***Strength of unskilled workers engaged as indirect workers including essential indirect worker***
Erecting	15% of the total strength of the erecting/shop.
Boiler	10% of the total strength of the Boiler shop.
Tender	15% of the total strength of the Tender shop.
Fitting	15% of the total strength of the Fitting shop.
Copper & Tin	15% of the total strength of the Copper & Tin shop.
Welding	12% of the total strength of the Welding shop.
Motion	10% of the total strength of the Motion shop.
Saw Mill	30% of the total strength of the Saw Mill shop.
Carriage Building	10% of the total strength of the Carriage Building shop.
Carriage Repair	10% of the total strength of the Carriage Repair/Shop.
Paint	10% of the total strength of the Paint shop.
Trimming	10% of the total strength of the Trimming shop.
Wagon building	12% of the total strength of the Wagon Repair shop.
Wagon repair	15% of the total strength of the Wagon repair shop.
General Iron Foundry	20% of the total strength of the General Iron Foundry.
Brass Foundry	25% of the total strength of the Brass Foundry.
Smith & Forge	10% of the total strength of the Smith & Forge shop.
Machine	10% of the total strength of the Machine shop.
Wheel	10% of the total strength of the Wheel shop.
Tool Room	10% of the total strength of the Tool Room.
Mill Wright	25% of the total strength of the Mill Wright.

3.4 For assessment of revised requirement of manpower (i.e *Artisan and Helpers*) for Tool Room, effective utilization of manpower is kept in consideration. The out-turn of the Tool Room shop is mainly given attention by the study team for assessment.

3.5 The section-wise deployment of Tool Room staff is shown in table under para 2.7.1. From the mentioned table, the points kept in consideration during the assessment are as under:

i) Out of total 75 on-roll staff (*Artisan and Helper*), 59 staff are working in different sections for contributing Tool Room's outturn. There is no contribution of 16 staff towards day to day outturn of Tool Room.

ii) The deployment of 59 staff of Tool Room is shown in table under para 2.7.1. It is observed that staff working at different sections are under different working scheme. The deployment of staff at different sections along with the scheme of working are listed underneath:

a) Five sections i.e Machine Section, General fitting section, Grinding section, Tool Equipment Section and Die sinking section are under incentive scheme. The staff of these sections are DW staff.
b) Staff of Coaching Section are from Grinding Section and Die-sinking section and work at Coach furnishing shop. Their outturn of Coaching section are included in the outturn of these two sections.
c) All the staff of EIW section are EIW staff.
d) Staff of Die-setting section and Pneumatic section are EIW staff of other shops i.e *(A-shop, J-shop, L-shop, C-shop & G-shop)* and their outturn are dependent on the outturn of respective shops.
e) Store and Calibration section are under non-incentive scheme.

3.6 Since, the staff working at different sections are under different working scheme, so, assessment has been done separately for different sections keeping in mind of their working system. Based on the working scheme, four different types of section has been observed.

i) Sections with DW staff *(5 sections viz. Machine Section, General fitting section, Grinding section, Tool Equipment Section and Die sinking section).*
ii) Sections with EIW staff *(i.e EIW section)*.
iii) Sections with EIW staff of other shop (i.e *Die-setting section and Pneumatic section).*
iv) Sections under non-incentive scheme (i.e *Store and Calibration section).*

In paragraphs below, the assessment for requirement of staff for different scheme of working has been done.

3.7 At first, the assessment for requirement of staff for *5* sections under incentive scheme *viz. Machine Section, General fitting section, Grinding section, Tool Equipment Section and Die sinking section* has been done.

It has been observed that all the "workload with allotted Allowed Time" of Tool Room are being executed by 5 sections with incentive scheme with every section performing different set of activities *(mentioned in details in paras from 2.8.1 to 2.8.5)*. The outturn of each section is different. The Allowed time earned by different sections reflects the actual out-turn of the corresponding section in terms of man-hours.

The total Allowed time of Tool Room for a month is the summation of Allowed time of all the sections of Tool Room for the corresponding month.

3.7.1 It can be seen from the data collected from Tool Room shop (*para 2.10.1 and 2.10.2*), the outturn varies every month, so study team considers outturn for the year 2017-18 and 2018-19 to get a more realistic and accurate assessment. The month-wise out-turn, Allowed time and Time Taken is depicted in the Chapter II.

3.7.2 From paras 2.10.1 and 2.10.2, the month-wise Outturn and corresponding Allowed time, Time Taken and Efficiency Percentage of DW staff *(Direct worker)* of Tool Room for the year 2017-18 and 2018-19 are tabulated under:

3.7.3.1 ***For the year 2017-18:***

S. No.	Month	No. of available hours in the month	Allowed Time (a)	Time Taken (b)	Time Saved (c=a-b)	Efficiency Percentage (d=c X 100/b)
1	Apr'17	162.50	11415.00	7936.00	3479.00	43.84
2	May'17	187.50	13059.14	9156.50	3902.64	42.62
3	Jun'17	177.50	11770.41	8196.50	3573.91	43.60
4	Jul'17	182.50	12670.81	8783.50	3887.31	44.26
5	Aug'17	187.50	13342.49	9305.50	4036.99	43.38
6	Sept'17	155.00	11589.91	8105.50	3484.41	42.99
7	Oct'17	160.00	10940.63	7672.00	3268.63	42.60
8	Nov'17	180.00	12276.91	8620.00	3656.91	42.42
9	Dec'17	177.50	11367.00	7995.00	3372.00	42.18
10	Jan'18	172.50	12008.72	8417.00	3591.72	42.67
11	Feb'18	170.00	11837.99	8391.50	3446.49	41.07
12	Mar'18	185.00	12283.44	8762.50	3520.94	40.18
Average		***174.79***	***12046.87***	***8445.13***	***3601.75***	***42.65***

3.7.3.2 ***For the year 2018-19:***

S. No.	Month	No. of available hours in the month	Allowed Time (a)	Time Taken (b)	Time Saved (c=a-b)	Efficiency Percentage (d=c X 100/b)
1	Apr'18	165.00	11390.68	7970.50	3420.18	42.91
2	May'18	187.50	11513.85	8084.30	3429.55	42.42
3	Jun'18	177.50	10200.00	7362.00	2838.00	38.55
4	Jul'18	185.00	11116.00	7792.00	3324.00	42.66
5	Aug'18	185.00	11292.00	7893.00	3399.00	43.06
6	Sept'18	170.00	10293.00	7182.00	3111.00	43.32
7	Oct'18	152.50	8883.00	6193.00	2690.00	43.44
8	Nov'18	167.50	10124.00	7042.00	3082.00	43.77
9	Dec'18	177.50	10195.00	7081.00	3114.00	43.98
10	Jan'19	180.00	10921.00	7829.00	3092.00	39.49
11	Feb'19	170.00	10229.00	7167.00	3062.00	42.72
12	Mar'19	172.50	10243.00	7172.00	3071.00	42.82
Average		***174.17***	***10533.38***	***7397.32***	***3136.06***	***42.43***

3.7.4 It can be seen from above paras that the outturn in terms of Allowed Time varies from every month. Therefore, for assessment study team considers the Average value.

So, from the outturn figure for the year 2017-18 and 2018-19, the average value of available working hours/month, Allowed time/month, Time taken/month is shown below:

Average No. of available hours/ month	***Average value of Allowed Time per Month***	***Average value of Time Taken per Month***	***Average value of Time Saved per month***	***Average value of Efficiency Percentage***
	(a)	***(b)***	***(c=a-b)***	***(d=c X 100/b)***
174.48	**11290.13**	**7921.23**	**3368.91**	**42.54**

In table above, the average value of Allowed time (AT) reflects the timing for average outturn in terms of man-hours.

Average Time Taken denotes the utilized man-hours to get the corresponding average outturn. It actually resembles the input factor of manpower and time i.e duty hours to get the outturn.

Therefore, the requirement of DW *(Direct Worker)* staff to achieve the average outturn (*i.e average AT 11290.13 manhours*) is calculated below.

From above table, Utilised Man-hours (i.e Time Taken) for average Outturn of AT 11290.13 manhours	***7921.23***
Average no. of available hours	***174.48***
Requirement of DW staff on the basis of assessment based on Average Outturn	*7921.23* / 174.48 = ***45.39***

So, the requirement of DW staff at 5 sections with incentive scheme based on assessment on the basis of Average Outturn is calculated as 45.39 ≈ 46

3.8 The requirement of EIW staff of Tool Room as per *<u>percentage of EIW staff</u>* for different activities as per *<u>IR Mechanical code</u>* tabulated in para 3.3.1 is assessed underneath:

Requirement of EIW staff on the basis of assessment based on average outturn	*= 10 % of DW staff of Tool Room* *= 10% X 46* *= **4.6***

So, the requirement of staff at EIW section based on assessment on the basis of Average Outturn is calculated as 4.6 ≈ 5.

3.9 The assessment for the requirement of staff has been done considering the Average Value of Outturn of two years. However, in table 3.7.3.1 and 3.7.3.2, it has been observed that in several months the outturn 'Allowed Time' is much more than the average value of Allowed time considered for assessment.

Therefore, in consideration with the above mentioned facts, study team concludes that an additional 10% staff is required over the assessed requirement of [46 (DW) + 5(EIW)] = 51 so that they can cater the higher workloads above the average value.

Thus, the requirement of staff considering additional 10% manpower is calculated as [51 + (10% of 51)] = 56.

3.10 The existing deployment of staff and workload of Die Setting Section and Pneumatic Section are mentioned in details in para 2.8.8 and 2.8.9. It is observed that staff of these two sections are EIW *(Essential Indirect workers)* of other shops and there outturn depends on the outturn of other shops.

Therefore, it is concluded by study team that existing deployment of 6 staff should be retained and this results in un-alteration of the existing men-on-roll of staff of these two sections.

3.11 The assessment of requirement of staff for Calibration Section and Store has been done in paragraphs below.

3.11.1 *Calibration Section:*

Presently, 5 staff are deployed in Calibration Section for repair and calibration work of around 2500 nos. of gauges, tools and instruments. The workload of Calibration Section is mentioned in details in para 2.8.10. This section is not only entrusted with the workload of calibration of Gauges of Liluah Workshop but Gauges from all over Eastern Railway are calibrated here.

Therefore, on scrutiny, it is concluded by the study team that additional 2 staff are required above existing MOR of 5 staff to cater existing workload smoothly.

Thus, the assessed requirement of staff for Calibration Section is calculated as 7.

3.11.2 *Tool Room Store:*

At present, altogether 4 staff are deployed in 2 shifts at Tool Room Store.

Two staff are deployed at main Godown. At the Tool Issue Counter, deployment of 1 staff is done for day shift and B shift. The workings and function of Tool Room Store is mentioned in details in para 2.7.11.

On scrutiny of the existing workload, it is concluded by the study team that additional 1 staff is required in Store, above existing MOR of 4 staff for smooth functioning of the section.

Thus, the assessed requirement of staff for Tool Room Store is calculated as 5.

3.12 From para 3.9, 3.10, 3.11.1 and 3.11.2, the requirement of staff *(including Leave Reserve)* for catering existing workload of Tool Room is calculated below:

S. No.	***Sections***	***Existing Deployment*** *(para 2.7.1)*		***Proposed Requirement***	***Reference Para***
1.	Machine Section	14			
2.	General Fitting Section	5		*56*	*3.9*
3.	Grinding Section	5			
4.	Tool Equipment Section	2			
5.	Die-sinking Section	3			
6.	Coaching Section	9	***59***		
7.	EIW Section	6			
8.	Die setting Section	3		*6*	*3.10*
9.	Pneumatic Section	3			
10.	Calibration Section	5		*7*	*3.11.1*
11.	Tool Room Store	4		*5*	*3.11.2*
Total		***59***		***74***	
Leave Reserve @12.5%		--		*9*	
Grand Total		**59**		**83**	

3.13 Assessment of s*taff working at PCO, L-shop and G-shop*

There are 16 Tool Room's staff working at PCO, L-shop and G-shop *(mentioned in details in para 2.7 and 2.7.1)* and cater the workload of the respective shops. From discussion with concerned officials, it has came to knowledge that to compensate the shortage of manpower at PCO, L-shop and G-shop, these Tool Room's staff are being utilized in these shops.

It is observed that these staff are being fully utilized for catering Railway work, therefore, it is recommended by study team that these 16 staff should be retained so that the outturn of PCO, L-shop and G-shop doesn't get hampered.

However, from field observation and discussion with concerned officials, it is observed that, Tool Room's supervisors are not able to supervise of these staff properly working in other shops. So, in view of this, study team concluded that a better supervision of these staff can be done if these staff are transferred to the respective place of working i.e PCO, L-shop and G-shop where supervisors of respective shops will supervise them. Consequently, this will result in increase in productivity of these staff.

Thus, in consideration with the discussion done in above paras, 16 staff are recommended by the study team for catering workload at PCO, L-shop and G-shop.

3.14 From para 3.12 and 3.13, the Revised requirement of staff is tabulated underneath:

Sections	***Sanctioned Strength*** *(Artisan & Helper Category staff)* *(para 2.6.1)*	***Existing Deployment*** *(para 2.7.1)*	***Proposed Requirement***	***Reference Para***
Requirement of staff for catering existing workload of Tool Room including Leave Reserve	119	***59***	*83*	*3.13*
Requirement of staff for working at PCO, L-shop, G-shop		***16***	*16*	*3.14*
Total	**119**	**75**	**99**	

3.15 Summarizing the Revised requirement *(including Leave Reserve)* of staff as discussed in above para, the posts to be rendered as surplus against the total existing sanctioned strength with the consideration of assessment made in the above paragraphs, may be seen from the following table.

	Sanctioned Strength *(para 2.7)*	***Men-On- Roll*** *(para 2.7)*	***Revised Requirement*** *(para 3.14)*	***Surplus***
Artisan & Erstwhile Gr. D *(only Helper category)*	119	75	99	20
Total	**119**	**75**	**99**	**20**

3.16 **Recommendations: -**

i) As mentioned in para 3.15, it is recommended that the Revised total requirement of Artisan & Helper to carry out the entire departmental workload presently catered by Tool Room's staff will be 99 posts which would result in surrender of **20 posts** as against the present total sanctioned strength of 119 posts *(para 2.7)*. The total requirement of manpower has been revised by the study team on the basis of assessment & analysis made in the foregoing paragraphs.

ii) Based on the discussion done in para 3.13, it is recommended to transfer Tool Room's staff working at Coach Furnishing Shop, PCO, L-shop and G-shop to their respective shop of working so that supervision of these staff can be done in a better way.

3.17 **Suggestion:-**

It has been observed that the department has outsourced the Calibration of Master Gauges & instruments to External agencies. However, the Calibration of Shop's and Division's measuring instruments and Gauges are being done departmentally. It is obvious that outsourcing of activities to external agencies results in more financial savings to Railways. Keeping in mind of financial benefit of Railways, it is suggested to increase the outsourcing of Calibration activities.

CHAPTER-IV

4.0 FINANCIAL APPRAISAL:

4.1 As per recommendation made in para 3.16, the total surplus posts works out to ***20 posts***. For an easy and smooth means of calculation of financial appraisal, the study team considered the posts from lowest grades with lowest Pay scale and Grade Pay.

A statement showing the minimum annual financial savings on account of surrender of total ***20 posts*** is furnished below.

Lowest Scale of Pay (Rs.)	***Lowest Grade Pay (Rs.)***	***Mean pay (in Rs)***	***Mean Pay (****as per 7th PC****) = 2.57 X Mean Pay*** *(as per 6th PC)*	***D.A (17%) (in Rs)***	***Total (in Rs)***	***No. of posts Recommended for Surrender***	***Monthly savings of total staff (in Rs)***	***Minimum Annual savings. (in lakhs Rs)***
(as per 6th Pay Commission)			***(as per 7th Pay Commission)***					
5200-20200/-	1800/-	14500/-	37265/-	6335/-	43600/-	***20***	8,72,000/-	***104.64***
TOTAL						***20***		***104.64***

Thus, the minimum annual financial savings works out to ***Rs. 104.64 lakhs***.