EASTERN RAILWAY

WORK STUDY REPORT

ON

REVIEW OF WORKLOAD VIS-À-VIS STAFF STRENGTH OF C SHOP (TIN SMITH SHOP) AT LILUAH WORKSHOP

(STUDY NO. WSER - 14/20-21)

(Submitted on 05.02.2021)

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BY

GM'S EFFICIENCY CELL
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ACKNOWLEDGEMENT

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

The study team will ever thankful to Dy. CME/Manufacturing/ Liluah, PE/ Liluah and WPO/ Liluah for their appropriate opinion and co-operation by supplying the necessary data to the study team.

The study team is also very thankful to Senior Section Engineer, Junior Engineer and other staff of C-shop 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 C-Shop
- 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 2020-21 as per recommendation done vide CWE's L.No. MG/791/MPP (WS) dtd. 10/07/20 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 C shop's staff will be 95 posts which would result in surrender of **29 posts** as against the present total sanctioned strength of 124 posts.	*3.11*

EXECUTIVE SUMMARY

Study Name & No.:	"REVIEW OF WORKLOAD VIS-A-VIS STAFF STRENGTH OF C-SHOP (TIN SMITH SHOP) AT LILUAH WORKSHOP" ***(STUDY NO.WSER -14/20-21)***
Year of conducting the study:	**2020 - 21**
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 C Shop. • Study of existing workload • Critical analysis of workload and manpower.
Existing Sanctioned Strength *(Artisan staff Helper category staff only)*	***124***
Existing Men on Roll *(Artisan staff Helper category staff only)*	***91***
Vacant post	***33***
Revised Requirement	***95***
Proposed Surrender	**29**

Justification
For assessment of Revised requirement of manpower in C Shop (Tin Smith Shop) at Liluah workshop, study team analyzes the effective utilization of manpower vis-a- vis assessment of Monthly Production. The review of manpower of C Shop at Liluah workshop is assessed considering the outturn of the shop for the year 2017-18, 2018-19 and 2019-20. 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 7th 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.

2015-16	:	180.75%
2016-17	:	165.25%
2017-18	:	181.15%
2018-19	:	185.98%
2019-20	:	169.75%

1.8 The aim of conducting this Workstudy is to review the manpower of C 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 Earlier, Tin Smith shop of LLH Workshop has been allocated the workload of electroplating work, buffing and polishing work, FRP work, powder coating work, Phosphating work, etc of various components of ICF coaches and wagons. The workload of overhauling of CTRB and repairing of BS doors of ICF coaches were later added to the workload of C shop.

2.4 Earlier, there were 6 sections present in C shop, they are:

i) CTRB section
ii) BS Door & other misc. item repair section
iii) Phosphating section
iv) Bahar line
v) Powder Coating and polishing section
vi) FRP item manufacturing section

2.4.1 Out of the above mentioned 6 sections, 5 sections are operative at present in C shop. The workload of 'Bahar line' has been outsourced to the external agencies in July'2020, only the supervision work is done by the supervisors of C shop.
The description of workload of these 5 sections has been mentioned in details in further paragraphs.

2.5 The existing position of Supervisory, Artisan and Erstwhile Group-D category staff of C-shop as on 01.09.2020 are mentioned underneath.

2.5.1 The category-wise Sanctioned strength vis-à-vis On-roll position of Supervisors of C-shop *(furnished by Personnel Branch)* is tabulated underneath:

S. No	Category	Sanctioned Strength	On-Roll Strength	Vacancy
1	Sr. Section Engineer	10	6	4
2	Junior Engineer	5	0	5
Total		***15***	**6**	**9**

2.5.2 The category-wise Sanctioned strength vis-à-vis On-roll position of Artisan and Erstwhile Gr. D staff of C-Shop/LLH Workshop (as on 01.09.2020 *(furnished by Personnel Branch*) is tabulated underneath:

S. No	Category	Sanctioned Strength	On-Roll Strength	Vacancy
	Artisan			
1	Sr. Tech.	31	26	5
2	Technician I	61	51	10
3	Technician II	9	5	4
4	Technician III	18	7	11
Sub-Total		***119***	***89***	***30***
	Erstwhile Group-D			
5	Helper	5	2	3
6	Peon	1	1	0
Sub-Total		***6***	***3***	***3***
Grand Total		**125**	**92**	**33**

2.6 The subject study is carried out to review the manpower of C Shop directly or indirectly involve with the workload of C Shop. 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 category 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 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.	31	26	5
2	Technician I	61	51	10
3	Technician II	9	5	4
4	Technician III	18	7	11
Erstwhile Group 'D' Category Staff				
5	Helper	5	2	3
Total		***124***	***91***	***33***

2.7 The workload carried out by the various sections of C-Shop (Tin Smith Shop) is mentioned in details in paragraphs below:

2.7.1 ***CTRB Section:***

2.7.1.1 CTRB Section deal with overhauling of Cartridge Tapered Roller Bearing (CTRB) of wagons. The process involve for overhauling of CTRB are as under:

i) Dismantling of CTRB and segregation of components (CUP, CONE, Backing ring, Spacer, Wear ring, etc).
ii) Cleaning of components.
iii) Inspection of components.
iv) Checking dimensions of all the components and rejecting the defective parts.
v) Assembly of the components by adjustment of 'Bench lateral play' between 0.51 mm to 0.66 mm by providing required size of spacer.
vi) Inspection of the assembled product.
vii) Lubrication is done by inserting required amount of Grease into the assembled CTRB and new grease seal is fitted.
viii) Packing of overhauled CRTB is done after stamping station code and month and year of overhauling.

2.7.1.2 Staff strength of Artisan and Erstwhile Gr 'D' of CTRB section *(furnished by concerned section)* as on September'2020 is tabulated below:

S. No.	Category	On-Roll Strength
1	Sr. Tech.	5
2	Technician I	18
3	Technician II	1
4	Technician III	5
5	Helper	0
Total		***29***

2.7.1.3 The statement showing outturn of CTRB section for the year 2017-18, 2018-19 and 2019-20 is tabulated below:

Months	During year 2017-18	During year 2018-19	During year 2019-20
	CTRB of Wagons	CTRB of Wagons	CTRB of Wagons
April	1012	1148	1085
May	879	1184	1087
June	831	1171	1180
July	1336	1349	1338
August	877	1497	1338
September	1204	1191	1245
October	1009	1133	816
November	1471	1293	1328
December	1261	871	1387
January	1447	1182	1426
February	1441	1284	1400
March	1547	1510	1013
Total	**14315**	**14813**	**14643**
Average	**1192.92**	**1234.42**	**1220.25**

2.7.2 ***B.S Door and other misc. repairing Section:***

2.7.2.1 This section deals with the workload of repairing of Body side (BS) door of ICF and BEML coaches. The processes followed during repair work are as under:

i) Detection of corroded portion of Body side (BS) door.

ii) Removal of corroded portion by Oxy cutting.

iii) Fabrication of removed portion (angle, Z-section strip, bottom lug and M.S plate) by arc welding.

iv) Grinding followed by painting of the finished product is done.

2.7.2.2 Staff strength of Artisan and Erstwhile Gr 'D' of B.S door and other misc. repairing section *(furnished by concerned section)* as on September'2020 is tabulated below:

S. No.	Category	On-Roll Strength
1	Sr. Tech.	10
2	Technician I	11
3	Technician II	1
4	Technician III	6
5	Helper	0
Total		***28***

2.7.2.3 The statement showing outturn of B.S door and other misc. repairing section for the year 2017-18, 2018-19 and 2019-20 is tabulated below.

Months	During year 2017-18	During year 2018-19	During year 2019-20
	B.S door repairing of ICF Coach	B.S door repairing of ICF Coach	B.S door repairing of ICF Coach
April	336	296	315
May	331	320	300
June	319	293	299
July	329	332	332
August	310	326	322
September	278	279	274
October	270	259	263
November	321	348	379
December	321	355	290
January	315	350	290
February	297	331	287
March	300	299	188
Total	**3727**	**3788**	**3539**
Average	**310.58**	**315.67**	**294.92**

2.7.3 ***Phosphating Section:***

2.7.3.1 This section is entitled to carry out the workload of phosphating of various components of wagons and ICF coaches. However, because of procurement of finished components by Railways for the purpose of cost savings, the workload of phosphating has reduced considerably which lead to closure of the Phosphating unit of Phosphating section in the year 2019.
The phosphating workload which still exists are being catered by 2 staff at the Phosphating unit of Spring shop.

2.7.3.2 Staff strength of Artisan and Erstwhile Gr 'D' of Phosphating section *(furnished by concerned section)* as on September'2020 is tabulated below:

S. No.	Category	On-Roll Strength
1	Sr. Tech.	0
2	Technician I	2
3	Technician II	0
4	Technician III	0
5	Helper	0
Total		***2***

2.7.3.3 The statement showing outturn of Phosphating section for various components of ICF coaches and wagons for the year 2017-18, 2018-19 and 2019-20 is tabulated below:

Months	During year 2017-18	During year 2018-19	During year 2019-20
	Phosphating of components	Phosphating of components	Phosphating of components
April	8436	12651	5869
May	11415	9196	3419
June	11129	9152	4874
July	8560	6105	5545
August	11421	9838	7612
September	7122	8285	5044
October	12025	5757	2714
November	7798	6761	3671
December	7079	6340	3915
January	6361	3687	2806
February	8775	5876	5219
March	12449	7409	1007
Total	***112570***	***91057***	***51695***
Average	**9380.83**	**7588.08**	**4307.92**

2.7.4 ***Powder Coating and polishing Section:***

2.7.4.1 The workload mainly carried out by this section:

i) Powder coating of various components of ICF coaches.

ii) Repairing and polishing of coach fittings and SS items such as SS wash basin, SS pan and SS wall protector.

2.7.4.2 Staff strength of Artisan and Erstwhile Gr 'D' of Powder coating and polishing section *(furnished by concerned section)* as on September'2020 is tabulated below:

S. No.	Category	On-Roll Strength
1	Sr. Tech.	3
2	Technician I	5
3	Technician II	0
4	Technician III	1
5	Helper	0
Total		***9***

2.7.4.3 The statement showing outturn of Powder coating and polishing section for the year 2017-18, 2018-19 and 2019-20 is tabulated below:

Months	During year 2017-18			During year 2018-19			During year 2019-20		
	SS Wash Basin of ICF coach	SS W/ Protector of ICF coach	SS Latrine Pan of ICF coach	SS Wash Basin of ICF coach	SS W/ Protector of ICF coach	SS Latrine Pan of ICF coach	SS Wash Basin of ICF coach	SS W/ Protector of ICF coach	SS Latrine Pan of ICF coach
April	200	345	15	314	176	24	121	255	18
May	89	437	4	78	440	4	94	287	26
June	176	366	12	176	296	5	138	218	29
July	126	500	11	198	246	14	112	289	18
August	222	257	12	162	333	4	170	162	6
September	194	289	4	80	262	32	41	226	10
October	194	218	0	106	274	12	12	312	9
November	82	343	3	81	227	8	103	216	14
December	46	290	0	18	382	28	143	306	24
January	63	392	0	96	332	0	223	320	7
February	110	334	0	127	251	20	251	270	14
March	97	369	23	75	292	11	91	216	8
Total	***1599***	***4140***	***84***	***1511***	***3511***	***162***	***1499***	***3077***	***183***
Average	**133.3**	**345.0**	**7.0**	**125.9**	**292.6**	**13.5**	**124.9**	**256.4**	**15.3**

2.7.5 ***FRP item manufacturing section:***

2.7.5.1 This section carries out the workload of manufacturing of various FRP items of ICF coaches. Earlier, repairing of cushioned seats and berths of ICF coaches were also done by staff of this section, but this workload discontinued in this section in the year 2020 and presently catered by staff of Tool Room shop.

2.7.5.2 Staff strength of Artisan and Erstwhile Gr 'D' of FRP item manufacturing section *(furnished by concerned section)* as on September'2020 is tabulated below:

S.No	Category	On-Roll Strength
1	Sr. Tech.	8
2	Technician I	9
3	Technician II	3
4	Technician III	4
5	Helper	0
Total		***24***

2.7.5.3 The statement showing outturn of FRP item manufacturing section for the year 2017-18, 2018-19 and 2019-20 is tabulated below:

Months	During year 2017-18		During year 2018-19		During year 2019-20	
	FRP Item mfg.	Rep. of Custioned Seat & Berth	FRP Item mfg.	Rep. of Custioned Seat & Berth	FRP Item mfg.	Rep. of Custioned Seat & Berth
April	546	764	489	292	503	512
May	490	404	536	356	446	332
June	524	332	566	390	574	370
July	526	566	531	512	524	474
August	501	518	882	488	591	312
September	331	414	485	312	465	616
October	429	582	362	434	487	560
November	548	642	451	368	581	474
December	367	578	572	498	498	298
January	456	400	606	332	244	396
February	250	306	754	280	477	416
March	481	292	553	482	338	252
Total	***5449***	***5798***	***6787***	***4744***	***5728***	***5012***
Average	**454.08**	**483.17**	**565.58**	**395.33**	**477.33**	**417.67**

2.8 The section-wise vis-à-vis month-wise Allowed time and Time Taken of C shop for the Year 2017-18, 2018-19 and 2019-20 are shown in tables below.

2.8.1 *During the Year 2017-18:*

S. No	Sections	April'17			May'17			June'17			July'17			August'17			September'17		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	CTRB Section	3603	2455	1148	3754	2557	1197	3791	2585	1206	4053	2763	1290	4112	2801	1311	3483	2367	1116
2	BS Door & Other Rep Sec	4656	3202	1454	5045	3470	1575	5005	3450	1555	5681	3912	1769	5608	3861	1747	4692	3231	1461
3	Phosphating Section	1477	1013	464	1579	1083	496	1632	1117	515	1626	1114	512	1813	1242	571	1606	1101	505
4	Bahar Line	1004	679	325	950	663	287	892	613	279	1232	843	389	1182	823	359	993	689	304
5	P/ Coating & polishing Sec	2405	1663	742	2637	1810	827	2515	1739	776	3097	2123	974	3095	2155	940	2534	1743	791
6	FRP Section	6762	4677	2085	7563	5245	2318	7589	5288	2301	7971	5522	2449	7885	5449	2436	7070	4888	2182
TOTAL		**19907**	**13689**	**6218**	**21528**	**14828**	**6700**	**21424**	**14792**	**6632**	**23660**	**16277**	**7383**	**23695**	**16331**	**7364**	**20378**	**14019**	**6359**
Total Working hours in the Month		**162.5**			**187.5**			**177.5**			**182.5**			**187.5**			**155**		

S. No	Sections	October'17			November'17			December'17			January'18			February'18			March'18		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	CTRB Section	3021	2055	966	3224	2200	1024	3868	2633	1235	3756	2552	1204	3331	2265	1066	3705	2526	1179
2	BS Door & Other Rep Sec	4614	3178	1436	5257	3615	1642	5001	3439	1562	5322	3665	1657	5008	3448	1560	4643	3195	1448
3	Phosphating Section	1577	1079	498	1660	1138	522	1592	1082	510	1723	1167	556	1566	1058	508	1511	1031	480
4	Bahar Line	969	687	282	1203	840	363	994	693	301	1090	765	325	1056	735	321	1217	838	379
5	P/ Coating & polishing Sec	2161	1503	658	2924	2010	914	2891	1948	943	2546	1728	818	2527	1708	819	2688	1850	838
6	FRP Section	6923	4799	2124	7752	5360	2392	7371	5110	2261	7538	5218	2320	7744	5355	2389	7594	5254	2340
TOTAL		**19265**	**13301**	**5964**	**22020**	**15163**	**6857**	**21717**	**14905**	**6812**	**21975**	**15095**	**6880**	**21232**	**14569**	**6663**	**21358**	**14694**	**6664**
Total Working hours in the Month		**160**			**180**			**177.5**			**177.5**			**170**			**170**		

2.8.2 *During the Year 2018-19:*

S. No	Sections	April'18			May'18			June'18			July'18			August'18			September'18		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	CTRB Section	3675	2497	1178	3481	2367	1114	3923	2738	1185	4609	3148	1461	4022	2742	1280	4025	2785	1240
2	BS Door & Other Rep Sec	5215	3586	1629	5802	3991	1811	5376	3748	1628	6169	4284	1885	6158	4302	1856	5597	3882	1715
3	Phosphating Section	1863	1277	586	1913	1352	561	1912	1328	584	1471	1004	467	1624	1121	503	1941	1339	602
4	Bahar Line	1057	732	325	1147	793	354	1232	862	370	1165	808	357	1091	765	326	1099	768	331
5	P/ Coating & polishing Sec	2424	1663	761	2361	1617	744	2270	1571	699	2340	1608	732	2321	1599	722	2087	1438	649
6	FRP Section	7643	5311	2332	8226	5695	2531	6836	4769	2067	7296	5087	2209	7294	5068	2226	7040	4887	2153
TOTAL		**21877**	**15066**	**6811**	**22930**	**15815**	**7115**	**21549**	**15016**	**6533**	**23050**	**15939**	**7111**	**22510**	**15597**	**6913**	**21789**	**15099**	**6690**
Total Working hours in the Month		**165**			**187.5**			**177.5**			**185**			**185**			**170**		

S. No	Sections	October'18			November'18			December'18			January'19			February'19			March'19		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	CTRB Section	3045	2104	941	3100	2142	958	3623	2503	1120	3388	2412	976	3363	2392	971	3390	2345	1045
2	BS Door & Other Rep Sec	4873	3342	1531	5417	3720	1697	5286	3636	1650	5470	3878	1592	4922	3392	1530	4547	3146	1401
3	Phosphating Section	1655	1146	509	1762	1206	556	1772	1208	564	1873	1313	560	1727	1214	513	1675	1163	512
4	Bahar Line	857	593	264	868	591	277	1128	778	350	1063	753	310	1031	700	331	776	533	243
5	P/ Coating & polishing Sec	1825	1249	576	1703	1170	533	2498	1695	803	2642	1882	760	2601	1823	778	2200	1553	647
6	FRP Section	6351	4403	1948	6374	4433	1941	6838	4743	2095	6333	4545	1788	6209	4296	1913	6005	4141	1864
TOTAL		**18606**	**12837**	**5769**	**19224**	**13262**	**5962**	**21145**	**14563**	**6582**	**20769**	**14783**	**5986**	**19853**	**13817**	**6036**	**18593**	**12881**	**5712**
Total Working hours in the Month		**152.5**			**167.5**			**177.5**			**180**			**170**			**170**		

2.8.3 *During the Year 2019-20:*

S. No	Sections	April'19			May'19			June'19			July'19			August'19			September'19		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	CTRB Section	3277	2268	1009	3740	2581	1159	3885	2690	1195	4491	3097	1394	4085	2824	1261	4462	3078	1384
2	BS Door & Other Rep Sec	4725	3265	1460	4653	3198	1455	4827	3335	1492	5136	3547	1589	5294	3643	1651	4992	3436	1556
3	Phosphating Section	1859	1281	578	1815	1266	549	1760	1208	552	2096	1440	656	1961	1346	615	1950	1355	595
4	Bahar Line	942	655	287	1002	690	312	784	540	244	1015	698	317	949	653	296	887	605	282
5	P/ Coating & polishing Sec	2587	1797	790	2296	1548	748	2234	1518	716	2647	1837	810	2719	1849	870	2402	1693	709
6	FRP Section	6555	4510	2045	5518	3816	1702	5538	3794	1744	6358	4375	1983	5849	4018	1831	5522	3805	1717
TOTAL		**19945**	**13776**	**6169**	**19024**	**13099**	**5925**	**19028**	**13085**	**5943**	**21743**	**14994**	**6749**	**20857**	**14333**	**6524**	**20215**	**13972**	**6243**
Total Working hours in the Month		**180**			**180**			**167.5**			**192.5**			**182.5**			**170**		

S. No	Sections	October'19			November'19			December'19			January'20			February'20			March'20		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	CTRB Section	3677	2550	1127	3553	2465	1088	4466	3094	1372	5255	3817	1438	4051	2895	1156	5255	3817	1438
2	BS Door & Other Rep Sec	4200	2893	1307	4741	3271	1470	5436	3751	1685	4925	3580	1345	5442	3827	1615	4925	3580	1345
3	Phosphating Section	1341	913	428	1705	1170	535	1317	908	409	604	447	157	785	584	201	604	447	157
4	Bahar Line	1015	683	332	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	P/ Coating & polishing Sec	2162	1503	659	2018	1388	630	2162	1489	673	3275	2402	873	2854	2043	811	3275	2402	873
6	FRP Section	4364	3077	1287	5523	3824	1699	6290	4317	1973	5622	4194	1428	5024	3638	1386	5622	4194	1428
TOTAL		**16759**	**11619**	**5140**	**17540**	**12118**	**5422**	**19671**	**13559**	**6112**	**19681**	**14440**	**5241**	**18156**	**12987**	**5169**	**19681**	**14440**	**5241**
Total Working hours in the Month		**155**			**172.5**			**180**			**177.5**			**177.5**			**115**		

CHAPTER-III

3.0 *CRITICAL ANALYSIS*

The subject work study has been conducted to review the manpower deployed in Tin Smith Shop (C-Shop) of Liluah Workshop under the control of Dy. CME (Manufacturing) 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 and 2.6.1, that study team is considering only Artisan and Helper Category staff for assessment.

3.3 The revised requirement of staff for Tin Smith shop (C shop) 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 The details of workloads related to manufacturing, maintenance and repair of various components ICF coaches and wagons carried out by different sections of C shop has been mentioned in Chapter II. It has been observed from outturn figure of LLH workshop that in recent years the outturn of LHB coaches has increases gradually. Railways has stopped the production of ICF coaches few years back, presently, only LHB coaches are being manufactured by the Railways.
At present, the nos. of ICF coaches maintained every year is more or less same and this will decrease in future. Thus, the workload of maintenance and repair of ICF coaches will also decrease in future.

The above mentioned fact has been taken into consideration by the study team during assessment for requirement of manpower for C-shop done in ongoing paragraphs.

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

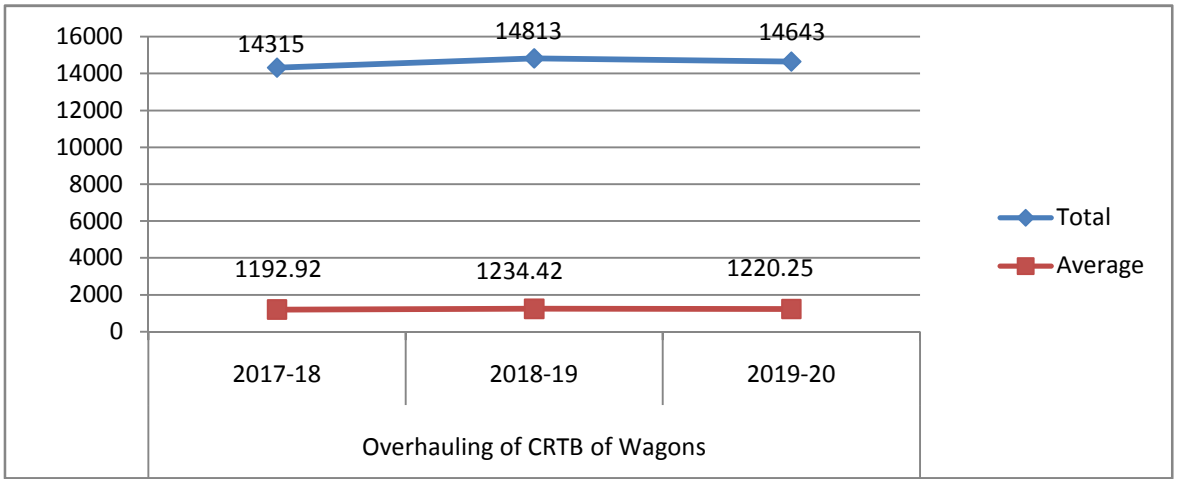
The month-wise out-turn, Allowed time and Time Taken is depicted in the para 2.8.1, 2.8.2 and 2.8.3. In paragraphs below, the assessment for requirement of staff has been done separately for different sections.

3.6 It can be seen from the data collected from C shop, the outturn varies every month, so study team considers outturn for the year 2017-18 and 2018-19 and 2019-20 to get a more realistic and accurate assessment.

The outturn for the year 2020-21 has not been considered for assessment since April'20 and May'20 were under lockdown period. However, the workshop opened from June'20, but till now, the working of the workshop has not returned to normalcy.

3.7.1. ***CTRB Section:***

3.7.1.1 The details of workload and manpower of CTRB section has been mentioned in para 2.7.1. From para 2.7.1.3, the outturn of CTRB section for the year 2017-18, 2018-19 and 2019-2020 is graphically represented below :



This section deals with the workload of overhauling of CTRB of wagons. It is observed from the above graph that the outturn of CTRB is almost constant in the year 2017-18, 2018-19 and 2019-20.

3.7.1.2 Thus, the requirement of manpower for CTRB section has been assessed considering the average value of outturn for the years 2017-18, 2018-19 and 2019-2020. From the outturn figure in terms of manhours shown in table under para 2.8.1, 2.8.2 and 2.8.3, the average value of available working hours/month, Allowed time/month, Time taken/month for CTRB section 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***
	(a)	***(b)***	***(c=a-b)***
172.91	**3820.6**	**2641.9**	**1178.7**

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 3820.6 manhours*) is calculated below.

From above table, Utilised Man-hours (i.e Time Taken) for average Outturn of AT 3820.6 manhours	***2641.9***
Average no. of available hours	***172.91***
Requirement of DW staff on the basis of assessment based on Average Outturn	*2641.9* / 172.91 = ***15.28***

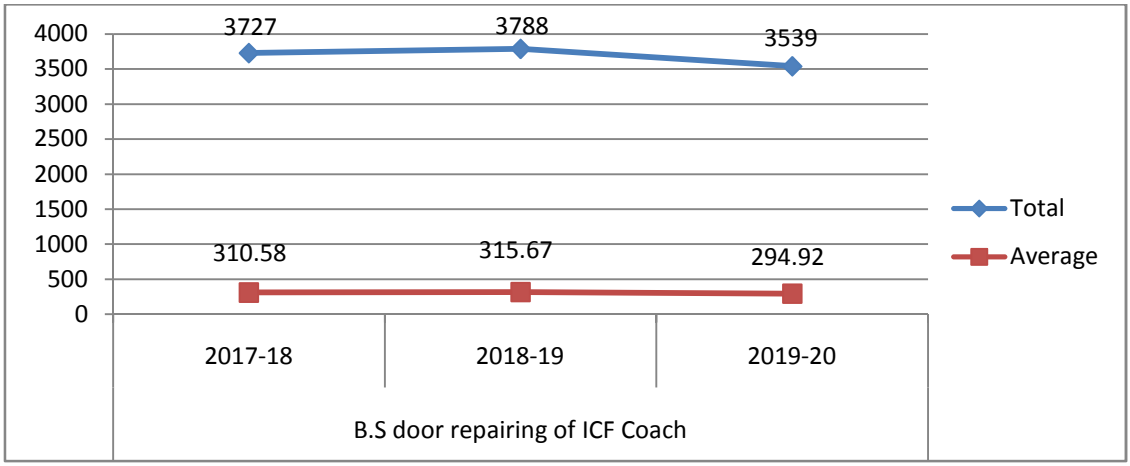
3.7.1.3 The requirement of EIW staff of Tin Smith shop as per *percentage of EIW staff* for different activities as per *IR Mechanical code* tabulated in para 3.3.1 is assessed underneath:

Requirement of EIW staff on the basis of assessment based on average outturn	*= 15 % of DW staff of CTRB sec* *= 15% X 15.28 =* ***2.29***

3.7.1.4 Thus, the requirement of DW and EIW staff at CTRB section based on assessment on the basis of Average Outturn is calculated as 15.28 + 2.29 = ***17.57 ≈ 18***.

3.7.2 ***B.S Door and other misc. item repairing Section:***

3.7.2.1 This section deals with the workload of repairing and maintenance of body side doors of ICF coaches. The details of workload and manpower of B.S Door and other misc. item repairing section is mentioned in para 2.7.2. From para 2.7.2.3, the outturn of B.S Door and other misc. item repairing section for the year 2017-18, 2018-19 and 2019-2020 is graphically represented below :



It is observed from the above graph that the outturn of B.S door repairing is almost flat during the year 2017-18, 2018-19 and 2019-20.

3.7.2.2 In consideration with the above graph, the requirement of manpower for B.S Door and other misc. item repairing section also has been assessed considering the average value of outturn for the years 2017-18, 2018-19 and 2019-2020. From the outturn figure in terms of manhours shown in table under para 2.8.1, 2.8.2 and 2.8.3, the average value of available working hours/month, Allowed time/month, Time taken/month for B.S Door and other misc. item repairing section 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***
	(a)	***(b)***	***(c=a-b)***
172.91	**5129.4**	**3552.8**	**1576.7**

The requirement of DW *(Direct Worker)* staff to achieve the average outturn (*i.e average AT 5129.4 manhours*) is calculated below.

From above table, Utilised Man-hours (i.e Time Taken) for average Outturn of AT 5129.4 manhours	***3552.8***
Average no. of available hours	***172.91***
Requirement of DW staff on the basis of assessment based on Average Outturn	*3552.8* / 172.91 = ***20.6***

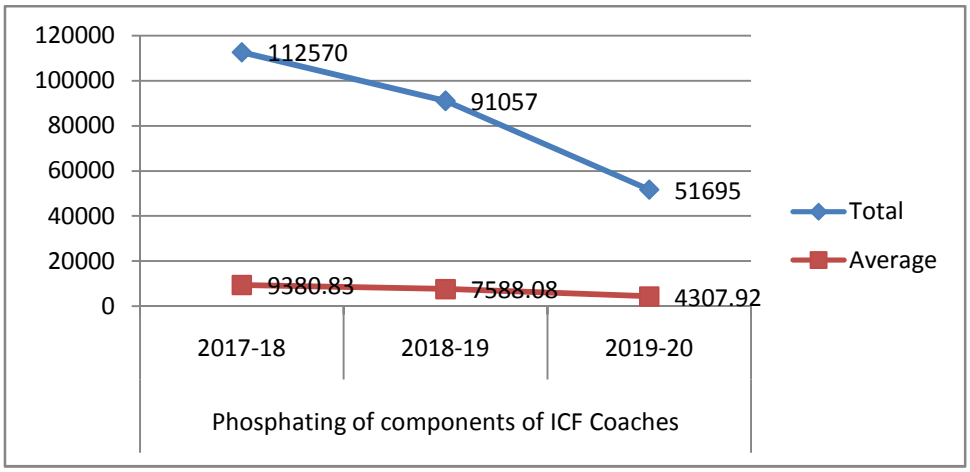
3.7.2.3 The requirement of EIW staff of B.S Door and other misc. item repairing section as per *percentage of EIW staff* for different activities as per *IR Mechanical code* tabulated in para 3.3.1 is assessed underneath:

Requirement of EIW staff on the basis of assessment based on average outturn	*= 15 % of DW staff of B.S Door Sec* *= 15% X 20.6 =* ***3.08***

3.7.2.4 The requirement of DW and EIW staff for B.S Door and other misc. item repairing section based on assessment on the basis of Average Outturn is calculated as 20.6 + 3.08 = **23.68 ≈ 24**.

3.7.3. ***Phosphating Section:***

3.7.3.1 The details of workload and manpower of Phosphating section has been mentioned in para 2.7.3. The outturn of Phosphating section for the year 2017-18, 2018-19 and 2019-2020 is graphically represented below :



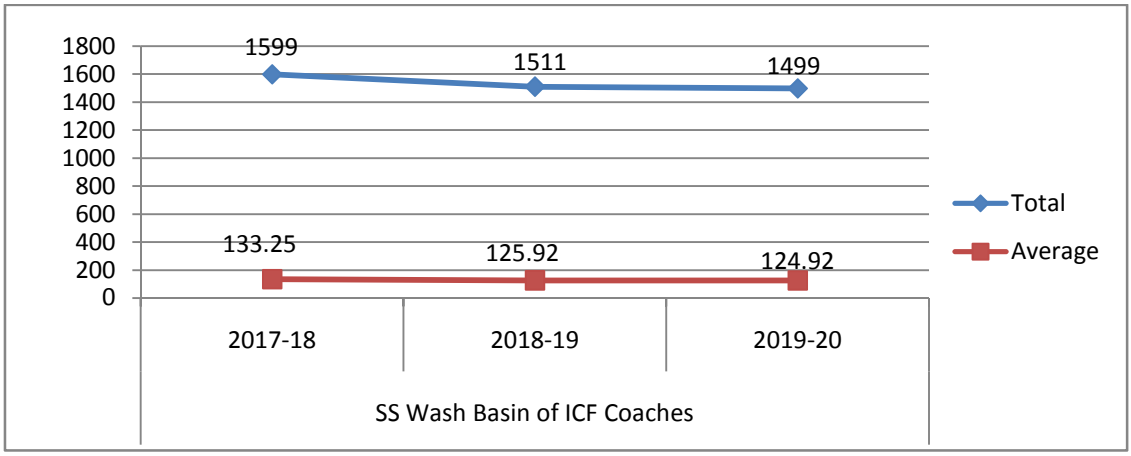
It has been clearly observed from above graph that the outturn of Phosphating section decreases considerably from the year 2017-18 to 2019-20. Because of the decline in workload of Phosphating section, the Phosphating unit of C-shop has been closed in the year 2020.

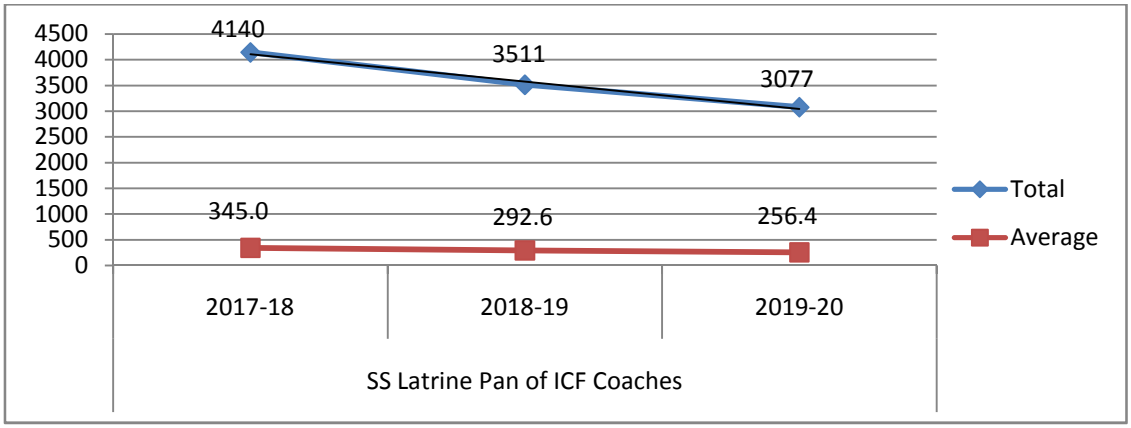
Currently, there is a small amount of departmental phosphating workload present which are being carried out by 2 staff of Phosphating section at Phosphating unit of Spring shop.

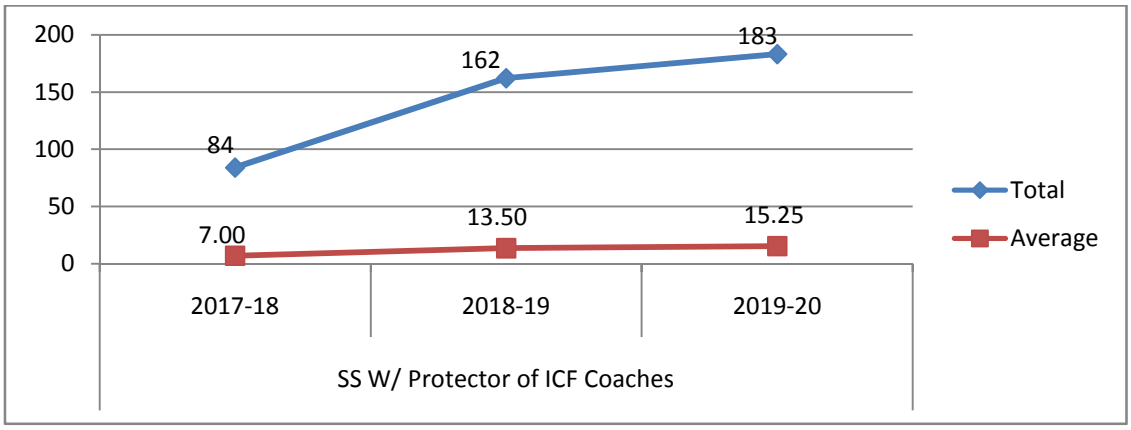
On scrutiny, it is concluded that existing 2 staff at this Section should be retained to carry out the existing departmental workload. and this results in un-alteration of the existing men-on-roll of this section. Thus, the actual requirement of manpower of Phosphating section is assessed as 2.

3.7.4 ***Powder coating & polishing section:***

3.7.4.1 The details of workload and manpower of Powder coating & polishing section is mentioned in para 2.7.4. It has been already mentioned that the outturn of this section mainly consists of repairing and polishing of SS Wash Basin, SS Pan and SS Wall protector of ICF coach. From para 2.7.4.3, the outturn of Powder coating & polishing section separately for different components ICF Coaches for the year 2017-18, 2018-19 and 2019-2020 is graphically represented below:







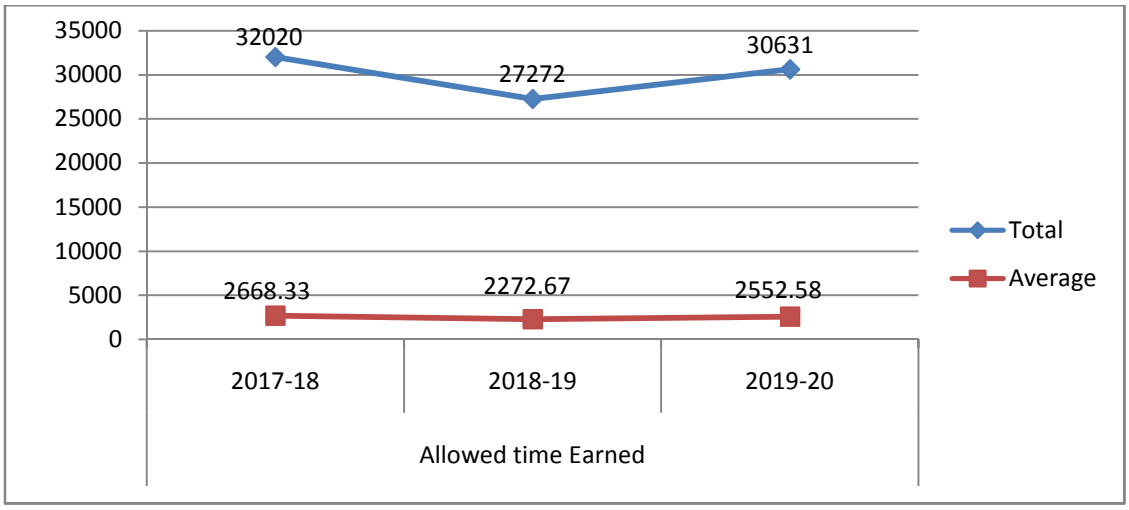
3.7.4.2 The observations noted from the above graphs are as under:

i) The outturn of SS Wash basin is more or less flat, during year 2017-18 to 2019-20.

ii) The outturn of SS Latrine Pan has declined from year 2017-18 to 2019-20.

iii) As far as outturn of SS Wall protector is concerned, the outturn increased significantly from year 2017-18 to 2019-20.

3.7.4.3 Due to dissimilarity of the pattern of outturn of different components of P/ coating section, no clear conclusion can be drawn from the above graphs. Thus, for purpose of further analysis, the graphical representation of the earning of Allowed time and Time taken of collective outturn on Powder coating section for the year 2017-18, 2018-19 and 2019-2020 *(from para 2.8.1,2.8.2 and 2.8.3)* has been plotted below:



It is clearly observed from the above graphs that represents the collective outturn of various components of Powder coating section *(in manhours)*, both earning of Allowed time and Time taken have declined from year 2017-18 to 2018-19 and then increases in the year 2019-20.

3.7.4.4 The study team has assessed the requirement of manpower of Powder coating section considering the average value of outturn for the years 2017-18, 2018-19 and 2019-2020. From the outturn figure in terms of manhours shown in table under para 2.8.1, 2.8.2 and 2.8.3, the average value of available working hours/month, Allowed time/month, Time taken/month for Powder coating section 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***
	(a)	***(b)***	***(c=a-b)***
172.91	**2497.9**	**1731**	**766.8**

The requirement of DW *(Direct Worker)* staff to achieve the average outturn (*i.e average AT 2497.9 manhours*) is calculated below.

From above table, Utilised Man-hours (i.e Time Taken) for average Outturn of AT 2497.9 manhours	***1731***
Average no. of available hours	***172.91***
Requirement of DW staff on the basis of assessment based on Average Outturn	*1731* / 172.91 = ***10.01***

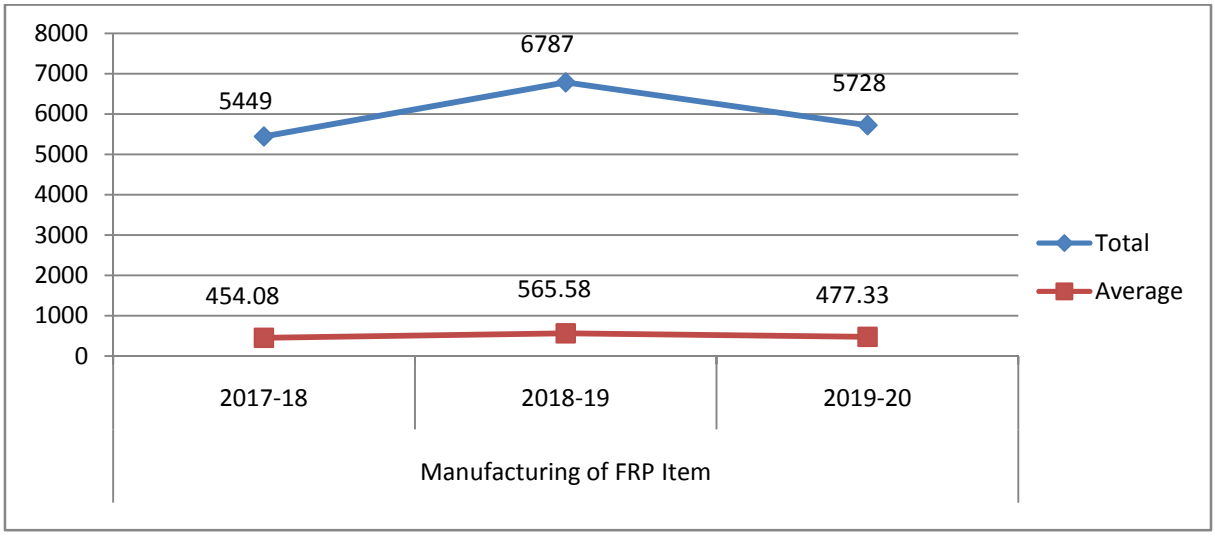
3.7.4.5 The requirement of EIW staff of Powder Coating section as per *percentage of EIW staff* for different activities as per *IR Mechanical code* tabulated in para 3.3.1 is assessed underneath:

Requirement of EIW staff on the basis of assessment based on average outturn	*= 15 % of DW staff of Powder Coating Sec = 15% X 10 =* ***1.5***

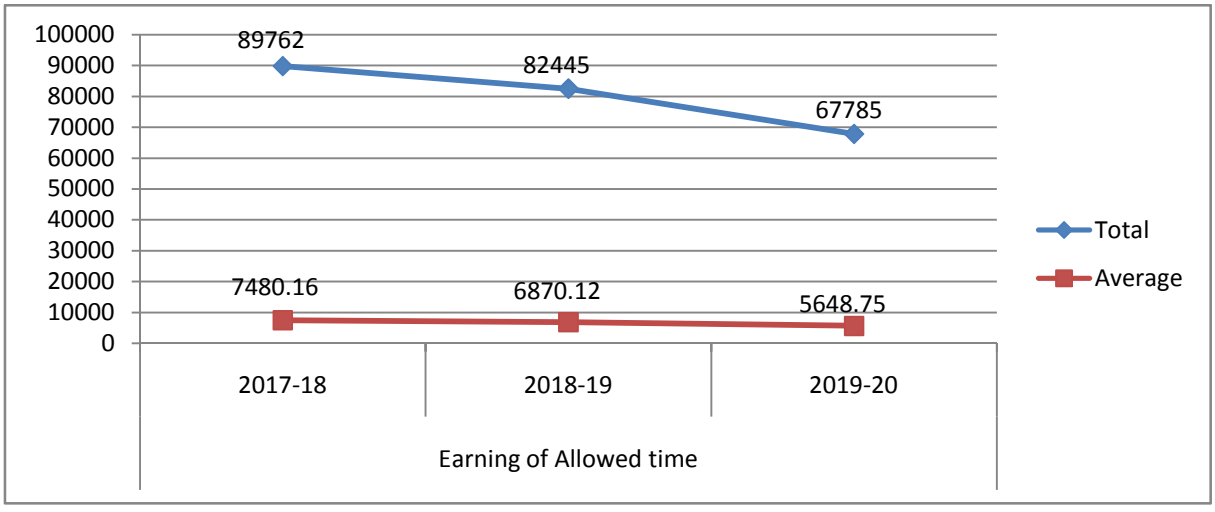
3.7.4.6 The requirement of DW and EIW staff at Powder coating and polishing section based on assessment on the basis of Average Outturn is calculated as 10 + 1.5 = ***11.5*** **≈ 12**.

3.7.5 ***FRP item manufacturing section:***

3.7.5.1 The details of workload and manpower of FRP item manufacturing section is mentioned in para 2.7.5. Earlier, the workload of this section mainly comprises of manufacturing of FRP items and repairing of cushioned seats. Later, the workload of repairing of cushioned seats has been transferred to Tool room shop in the year 2020 and at present staff of this section is only catering the workload manufacturing of FRP items.
From para 2.7.5.3, the outturn of FRP section in regard to manufacturing of FRP items of ICF Coaches for the year 2017-18, 2018-19 and 2019-2020 is graphically represented below:



3.7.5.2 Also, the graphical representation of the earning of Allowed time and Time taken of outturn of FRP item manufacturing section for the year 2017-18, 2018-19 and 2019-2020 *(from para 2.8.1,2.8.2 and 2.8.3)* has been shown underneath:



The Allowed time earned for FRP item manufacturing section shown in above graph consists of Allowed time of both manufacturing of FRP item and repairing of Cushioned seats. It can be observed from above graph that the Earning of Allowed time declined from year 2017-18 to 2019-20. However, from the graph mentioned in para 3.7.5.2, it can be seen that the outturn of FRP item manufacturing is more or less constant during the year 2017-18, 2018-19 and 2019-20.

Therefore, it can be said that the outturn of repairing of cushioned seat declined from year 2017-18 to 2019-20. This workload further discontinued in the year 2020.

Thus, in consideration of the above mentioned facts, study team considers the outturn of the year 2019-20 for assessment of requirement of manpower for FRP item manufacturing section for catering the existing workload of the section.

3.7.5.3 From the outturn figure in terms of manhours shown in table under para 2.8.3, the average value of available working hours/month, Allowed time/month, Time taken/month for FRP item manufacturing section for the year 2019-20 is shown below:

Average No. of available hours/ month for the 2019-20 year	***Average value of Allowed Time per Month for the 2019-20 year***	***Average value of Time Taken per Month for the 2019-20 year***	***Average value of Time Saved per month for the 2019-20 year***
	(a)	***(b)***	***(c=a-b)***
170.8	**5649**	**3964**	**1685**

The requirement of DW *(Direct Worker)* staff to achieve the average outturn (*i.e average AT 5649 manhours*) is calculated below.

From above table, Utilised Man-hours (i.e Time Taken) for average Outturn for year 2019-20 of AT 5649 manhours	***3964***
Average no. of available hours of year 2019-20	***170.8***
Requirement of DW staff on the basis of assessment based on Average Outturn of year 2019-20	*3964* / 170.8 = ***23.21***

3.7.5.4 The requirement of EIW staff of FRP item manufacturing section as per *percentage of EIW staff* for different activities as per *IR Mechanical code* tabulated in para 3.3.1 is assessed underneath:

Requirement of EIW staff on the basis of assessment based on average outturn	*= 15 % of DW staff of FRP Sec* *= 15% X 23.21 =* ***4.02***

3.7.5.5 The requirement of DW and EIW staff of FRP item manufacturing section based on assessment on the basis of Average Outturn is calculated as 23.21 + 4.02 = 27.23 **≈ 28**.

3.8 From paras 3.7.1.4, 3.7.2.4, 3.7.3.1, 3.7.4.6 and 3.7.5.5, the total requirement of staff *(including Leave Reserve)* is calculated below:

S. No.	***Sections***	***Existing Deployment*** *(para 2.6.1)*	***Proposed Requirement***	***Reference Para***
1.	CTRB Section	*91*	*18*	*3.7.1.4*
2.	B.S Door and other misc. item repairing section		*24*	*3.7.2.4*
3.	Phosphating Section		*2*	*3.7.3.1*
4.	Powder Coating & polishing Section		*12*	*3.7.4.6*
5.	FRP item manufacturing Section		*28*	*3.7.5.5*
Total			***84***	
Leave Reserve @12.5%			***10.5***	
Grand Total		**91**	**94.5 ≈ 95**	

3.9 The assessment of requirement of staff for C shop has been done in above paras in consideration with the outturn as well as effective utilization of manpower. Thus, the Revised requirement of staff is calculated as **95**.

3.10 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 2.6.1)*	***Men-On- Roll*** *(para 2.6.1)*	***Revised Requirement*** *(para 3.9)*	***Surplus***
Artisan & Erstwhile Gr. D *(only Helper category)*	***124***	***91***	***95***	**29**

3.11 **Recommendation: -**

As mentioned in para 3.10, it is recommended that the Revised total requirement of Artisan & Helper to carry out the entire departmental workload presently catered by C-Shop's staff will be 95 posts which would result in surrender of **29 posts** as against the present total sanctioned strength of 124 posts *(para 2.6.1)*. The total requirement of manpower has been revised by the study team on the basis of assessment & analysis made in the foregoing paragraphs.

CHAPTER-IV

4.0 FINANCIAL APPRAISAL:

4.1 As per recommendation made in Para 3.11, the total surplus posts works out to 29 posts. For an easy and smooth means of calculation the study team has considered the lowest grades of vacant post while calculating the financial appraisal.

A statement showing the total annual financial savings on account of surrender of 29 posts is furnished below.

Category	**Grade Pay** *(Fig. in Rs.)*	**Level**	**Mean Pay**	**DA @ 17%**	**Total /Month**	**No. of Posts surrendered**	**Annual savings** *(Fig. in Rs.)*
			(Fig. in Rs.)				
Helper	1,800/-	1	20,750/-	3,528/-	24,278/-	3	8,73,990/-
Technician III	1,900/-	2	22,950/-	3,902/-	26,852/-	11	35,44,398/-
Technician II	2,000/-	3	25,050/-	4,259/-	29,309/-	4	14,06,808/-
Technician I	2,400	4	29,400/-	4,998/-	34,398/-	10	41,27,760/-
Sr. Technician	2,800/-	5	33,650/-	5,721/-	39,371/-	1	4,72,446/-
TOTAL						**29**	**1,04,25,402/-**

Thus, the annual financial savings works out to ***Rs. 104.25 lakhs.***