EASTERN RAILWAY

WORK STUDY

ON

REVIEW OF WORKLOAD VIS-À-VIS STAFF STRENGTH OF AUXILIARY AND GENERAL MOTOR REPAIR SHOP AT KANCHRAPARA WORKSHOP

(STUDY NO. WSER – 12/2020-21)

(Submitted on – 12.01.2021)

Study guided by: Sri S. Chandra, AEO

Study conducted by: Sri K. K. Chatterjee, CPLI

BY

GM'S EFFICIENCY CELL

EASTERN RAILWAY

KOLKATA

C O N T E N T S

ACKNOWLEDGEMENT

The study team is very much thankful to Dy. CEE/Eastern Railway/KPA, AWM/EL for their guidance and advice. The study team is also thankful to SSEs of Shop No. 34 / KPA and other concerned officials for their co-operation and support to conduct the subject Work Study.

AUTHORITY

As approved by the competent authority, the subject work-study has been undertaken by the GM's Efficiency Cell during the current financial year.

TERMS OF REFERENCE

The subject work-study has been conducted with the following Terms of References-

1. Evaluate the existing workload vis-a-vis manpower concerned.
2. Rationalisation of manpowerwith respect to work-load.

METHODOLOGY:

During work study, the study team adopted the following methodology to ascertain the requirement of staff at different Power Shed based on their existing workload.

1. Consideration of section-wise workload.
2. Consideration of section-wise deployment of workforce (Skilled, semi-skilled & un-skilled).
3. Consideration of Month-wise output.
4. Discussion with respective Technical personnel regarding the quantum of work-load and its timely compliance.

SUMMARY OF RECOMMENDATION

Sl. No.	Recommendation	Para Ref.
1.	The Revised Sanctioned Strength of Auxiliary and General Motor Repairing Shop of Kanchrapara Workshop / Eastern Railway would be 43 Posts as against the Present Sanctioned Strength of 114 Posts. Thus, the resulting (114 – 43) i.e.71 Posts are identified as 'Surplus' and hence recommended for 'Surrender'.	2.26.0.

CHAPTER-I

1.0.0. INTRODUCTION:

1.1.0. Indian Railway is the life-line of nation for providing Transportation facility over the length and breadth of country. Its vision is to provide efficient, affordable, customer-focused and 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.

1.2.0. India's railway network is recognised as one of the largest railway systems in the world under single management and moreover, it is among the world's largest RailwayNetwork.

1.3.0. Indian Railway is not only concerned with its mere operation. It is a Transportation service providing Industry. It is alsothe prime mover of India's Infra-structure.

1.4.0. Railway Personnel have to perform at 24 X 7 in every conceivable situation. The commitment, dedication and integrity towardsservice is the fabric that binds Indian Railway men to achieve their mission of 'Safety', 'Security' & 'Punctuality'. In this way, Indian Railway full-fill its social responsibility and well-being at all levels of society.

1.5.0. The Railway organisation has gradually changed its policy according to its needs and availability of resources. It has transformed the source of its motive power from Steam to Diesel and then to Electric for moving vehicle. Diesel Power Sheds are located at various locations to provide the Loco Pilot (Goods & Passenger), shunting staff, other maintenance staff and supporting staff for movement/maintenance of vehicle/loco.

1.6.0. Eastern Railway comprises 04 Divisions viz. Sealdah, Howrah, Asansol &Malda. Moreover, there are 03 Workshops viz. Kanchrapara Workshop, Liluah workshop & Jamalpur Workshop within the purview of Eastern Railway.

1.7.0. The said 3 Workshops are entrusted to perform Periodic Overhauling (POH) of various types of Rolling Stock.

1.8.0. Accordingly, Kanchrapara Workshop conducts POH of Conventional Coaches, Electric Locomotives, EMU Trailer Coaches, EMU Motor Coaches, Tower Van, etc.

1.9.0. In the said POH activities and other Plant & Machineries Maintenance work of Kanchrapara Workshop, Auxiliary & General Motor Repairwork has a significant role.

1.10.0. Eastern Railway has recently completed several electrification projects and by this year end, more than 90% Electrification is going to be completed. Thus, utilization of Diesel Power will be gradually diminished in several sections over Eastern Railway. At the same time, updated version of Electric Locomotives is gradually introduced in place of Diesel Locomotives. Thus, workload pertaining to POH of Electric Locomotives becomes more importantday by day.

1.11.0. Keeping in mind of the above, GM's Efficiency Cell has been engaged to conduct the subject work study to find out the actual requirement of staff pertaining to different kinds of Electric Motor Coaches.

CHAPTER-II

2.0.0. Existing Scenario & Critical Analysis

2.1.0. Kanchrapara Workshop is designed for POH of Electric Locomotive, Non-AC Conventional Coaches (both PCV & OCV), EMU / MEMU / DEMU Trailer Coaches & Motor Coaches, Tower Van, etc.

2.2.0. Currently, Shop No. 34 of Kanchrapara Workshop caters the undermentioned Workload –

(A) Periodic Overhauling (POH), Partial Repair/Re-Winding (PRW) &Re-Winding (RW) of three phase (3Ø)& single phase (1Ø) Induction Motors of different Plant & Machineries (M&Ps) associated withKanchrapara Locomotive & Carriage Complex, Filter House, etc.

(B) POH, PRW, &Re-Windingof Arc Welding transformers which are used in Locomotive & Carriage Complex of Kanchrapara Workshop.

2.3.0. Presently, Shop No. 34 has 04 Sections viz. -

(1) General Armature Section.
(2) Light Rotating Machine Section (Heavy Armature) [LRM (HA)] Section.
(3) Machine Section.
(4) RW Store Section.

2.4.0. Activities / Functions of the above sections are as follows -

(1) General Armature Section.

(A) POH, PRW & Re-Winding (RW) of different kinds of 3-Phase & Single-Phase Induction Motors pertaining to various Machineries & Plants mentioned below –

a) Slip Ring Motor of Cranes.
b) Water Pump Motor of Filter House.
c) Cooling Pump Motor.
d) SIV Blower Motor related to POH of Electric Locomotive.
e) RW/PRW of Motors associated with Wheel Press Machine.

(B) Re-Winding of different kinds of Transformers, such as –

a) Transformers which are associated with various types of M&Ps.

b) 'Current Transformers (CT)' of Electric Locomotive.

c) 'Brake Coil' of Cranes.

d) 'Hold On Coil' of Motor Stator.

e) Repair /Re-Winding of Auto Transformers.

f) Fabrication of Step-up Single-phase Transformer 22 KVA (Having Input Voltage 141 Volt AC & output Voltage 210 / 220 / 230 / 240 Volt AC) for operating 02 Ton Split Air Conditioner in VIP Saloon. The 'Core', which is necessary to construct the Transformer, is collected from 'Flawed Auxiliary Transformers' of Electric Locomotives (In-turned for POH). So far, one such fabricated Transformer is installed in a VIP Saloon Car.

g) Fabrication of Step-down Single-phase Transformer 33 KVA (Having Input Voltage 415 Volt AC & Output Voltage 140 ± 10 Volt AC) for Hybrid Loco Shunting Car. The 'Core', which is necessary to construct the Transformer, is collected from 'Flawed Auxiliary Transformers' released from Electric Locomotives (In-turned for POH). So far, one such fabricated Transformer is installed in a Hybrid Loco Shunting Car.

h) Fabrication of Step-down Single-phase Transformer 22 KVA (Having Input Voltage 390 Volt AC & Output Voltage 140 ± 10 Volt AC) for Loco Shunting Car. The 'Core', which is necessary to construct the Transformer, is collected from 'Flawed Auxiliary Transformers' released from Electric Locomotives (In-turned for POH). So far, one such fabricated Transformer is installed in a Loco Shunting Car.

i) Fabrication of Step-down Transformer 32 KVA (Having Input Voltage 350 Volt AC & Output Voltage = 110, 120, 130 Volt AC) for battery Charging of DMU Tower Car. The 'Core', which is necessary to construct the Transformer, is collected from 'Flawed Auxiliary Transformers' released from Electric Locomotives (In-turned for POH). So far, two such fabricated Transformer is installed for Battery Charging in a DMU Tower Car.

The above-mentioned Workloads, vide Sl. No. f) to i)above, are so far developmental in nature.

(C) POH, PRW & Re-Winding (RW)of Arc Welding Transformers functioning at Locomotive & Carriage Complex / Kanchrapara Workshop.

(2) <u>Light Rotating Machine Section (Heavy Armature) Section</u>:

(a) POH of Air-dryer.

The job includes Stripping, 'POH' &Equipping of 'Air-dryers',pertaining toEMU Motor Coaches which In-turnsfor POH.

(b) POH, PRW of EMU MCP / Armature and Frame.

(3) Machine Section:

The section conducts various types of Repair / Rectification job of Motor components through machining operations like Turning, sawing, etc.

(a) Rectification of broken or defective Motor shafts.

(b) Rectification / Repair of 'Slip Ring', associated with Motors for general purpose.

(c) Key slot machining of different motor shafts.

(d) Turning & finishing of motor shafts after re-metalling of the same.

(e) Turning and Repairing of 'End Cover' of general-purpose motors.

(f) For filter house, release and re-fitment of impeller sleeve bush on pump motor after necessary Turning / Machining,

(g) Machining of shaft for Mica undercutting machine of Shop No. 14 and Shop No. 9A /KPA.

(h) Reduction of bearing sleeve thickness through Turning.

(i) Reduction of thickness of EMU Traction Motor wiper.

(j) Machining of male-female connecting bush for welding transformer with stud, nut.

(k) Preparation of 'Spindle' for pump motor of Filter house / Shop No. 35.

(l) Etc.

The Machine Section of Shop No. 34 has a good nos. of Plant & Machineries, though, a few nos. of those are needed to be functional for outturn.

The condition-based segregation of the aforesaid Plant & Machineries, as per the office document of Shop No. 34, is tabulated below –

Sl. No.	Present Condition of Plant & Machineries	Nos. of Machineries	Nos. of Plant
1.	Good but very irregular in use	05	02
2.	Good & in use	13	12
3.	Working, but Stroke length is not in control	01	NIL
4.	Good & regular in use	02	NIL
5.	Not Working	02	NIL
6.	Working	01	NIL
7.	Working, but not in use	02	01
Total		26	15

Study team noticed that Shop No. 34 did not maintain any Plant / Machinery – wise 'Log book' from which utilization of the above M&Ps could be ascertained. However, it is clear that use of available M&Ps of Shop No. 34 is insubstantial in nature.

(4) RW Store Section

Shop No. 34 maintains a sub-store,mainly for 'Motor Winding Copper Wire' of different 'SWG' & 'Gross Weight'. Besides that, the said sub-store holds stock of HSS Cutting Tools, Electric Motor spares, etc.

02 Artisan Staff are deputed here to cater the associated work- load.

2.5.0. Study team learnt that, sometimes before, the workload pertaining to"Re-winding of Auxiliary Motors of Electric Locomotives / EMU Motor Coaches" is off-loaded from Shop No. 34.Previously, one complete section was assigned to cater the said work-load. But, as of now, there is neither the existence of saidwork-load nor the section.

2.6.0. It is obvious, that the sanctioned strength of Shop No. 34 was designed initially after considering, the then existing workload which covers the present workload plus the already off-loaded workload as detailed in previous para. But, even after said off-loading, Sanctioned Strength of Shop No.34 remains unaltered.

2.7.0. Dy.CPO/W/E.Rly./KPA vide his office letter no. PB/Misc./OS(P)/Pt. V, dated 04/09/2020 stated the Staff position of Shop No. 34, as per Book of Sanction. The Staff position, as furnished so, is tabulated below –

Category	Sanctioned strength (S/S)	Men-On-Roll (MOR)	Vacancy (Vac)
Mech. Fitter	32	04	28
Elect. Fitter	17	11	06
Painter	02	02	0
Machinist	14	08	06
Armature Winder	40	08	32
Helper	09	01	08
Total	114	34	80

2.8.0. The Study-Team noticed that a good nos. of surplus Artisan Staff, Helpersare migrated from Shop No. 14and deployed to Shop No. 34. Moreover, to operate the EOT Crane of shop, 01 Crane Driveris also hired from Shop No. 6 on monthly basis.

The staff of Shop No. 14 & Shop No. 6 are enjoying the sanctioned posts of their respective mother shopsnot the sanctioned posts of Shop No. 34. Their Lien / Seniority is also maintained accordingly.

The details break-up of the such section-wise deputed staff inShop No. 34 is tabulated below-

Sl. No.	Name of Sections in Shop No. 34	Break-up of total deputed Staff in Shop No. 34			
		From Shop No. 34	From Shop No. 14	From Shop No. 6	Total
1.	General Armature Section	7	1	NIL	8
2.	Light Rotating Machine (Heavy Armature) Section.[LRM (HA) Section]	9	2	1	12
3.	Machine Section	4	2	NIL	6
4.	Store Section	1	1	NIL	2
Total		21	6	1	28

The above table shows thatpresent workload of Shop No. 34 is catered by 28 staff which comprised 21staff of Shop No. 34, 06 surplus / migratedstaff of Shop No.14 & 01 hired staff of Shop No. 6.

2.9.0. Deputation of category-wise/ shop-wiseMan-power at Shop No. 34 -

Sl. No.	Designation of Staff deputed in Shop No.34	Nos. of Staff deputed			
		Of Shop No. 34	Of Shop No. 14	Of Shop No. 6	Total
1.	Mech. Fitter	02	NIL	NIL	02
2.	Elect. Fitter	04	01	NIL	05
3.	Painter	01	NIL	NIL	01
4.	Machinist	05	NIL	NIL	05
5.	Turner	02	NIL	NIL	02
6.	Carpenter	01	NIL	NIL	01
7.	Armature Winder	04	02	NIL	06
8.	Crane Driver	NIL	NIL	01	01
9.	Rigger-cum-Gunner	01	NIL	NIL	01
10.	Helper	01	03	NIL	04
Total		21	06	01	28

2.10.0. The office record of Shop No. 34 shows that total 13 Nos. of its own staff are deputed in Shop No. 14, Shop No. 11 & Shop No. 9 due to some administrative ground. The Shop No.- wise Break-up of such kinds of staff is tabulated below –

Sl. No.	Designation of Shop No. 34 Staff deputed in other Shop Nos. 14, 11 & 9	Nos. of Staff deputed			
		Shop No. 14	Shop No. 11	Shop No. 9	Total
1.	Mech. Fitter	02	NIL	02	04
2.	Elect. Fitter	01	NIL	03	04
3.	Painter	NIL	01	NIL	01
4.	Turner	01	NIL	NIL	01
5.	Armature Winder	NIL	03	NIL	03
Total		04	04	05	13

2.11.0. The facts and figures coming out from the above two tables are -

(A) Nos. of Shop No. 34's own staff deputed at Shop No. 34 = 21
(B) Nos. of Other Shop's staff deputed at Shop No. 34 = 07
(C) Total Nos. of Staff deputed at Shop No. 34 [(A)+(B)] = 21 + 07 = 28
(D) Nos. of Shop No. 34's own staff deputed at other Shop = 13
(E) Men-On-Roll as per the Book of Sanction [(A)+(D)] of Shop No. 34. = 21 + 13 = 34

2.12.0. All the POH & other associated activities which are performed by Workshop's Direct Worker (DW) are quantified in terms of Man-Hrs. through Time Study by 'Rate Fixer' of 'Planning Department'. While the activities of rest categories, i.e. Ministerial Staff, JEs &SSEs could not be assessed in that way as their job assignment are supporting in nature.

2.13.0. Hence, to measure performance of each section of Shop No. 34, available monthly Man-Hrs., Section-wise Allowed Time i.e., Total Output in man-Hrs., etc.are considered as a key tools.

2.14.0. The section-wise job assignments, as illustratedin the earlier paras, are may be considered as regular activities of sections. In reality, the activities to be performed in the context of POH work is guided by the condition of Motors.

2.15.0. In CLW pattern of Incentive Scheme, it is mandatory to keep the Earning percentage as 50% (Maximum). In case of 50% or around 50% (i.e. 45.00 to 50.00%)Incentive Earning of a section, it may be concluded that the sectional staff are working with their utmost efficiency.

2.16.0. To get an Idea about the Quantum of job, catered by Shop No. 34, Study-team explored the Shop's Section-wise Monthly Incentive calculation datawhich istabulated below:-

(A) General Armature Section:

Month	Total Output (Allowed Time i.e. **A/T**) [In Man-Hrs.]	Total input (Time Taken i.e.**T/T**) [In Man-Hrs.]	Time Saved (**T/S** = A/T - T/T) [In Man-Hrs.]	**% of Earning** (T/S x 100%)
Oct-19	2356.00	1574.00	782.00	49.68
Nov-19	2515.00	1680.00	835.00	49.70
Dec-19	2591.00	1732.00	859.00	49.60
Jan-20	2868.00	1916.00	952.00	49.69
Jun-20	2357.00	1574.00	783.00	49.75
Jul-20	2414.00	1612.00	802.00	49.75
Aug-20	1874.00	1252.00	622.00	49.68
Sep-20	2243.00	1498.00	745.00	49.73

(B) Light Rotating Machine (Heavy Armature) [LRM (HA)] Section:

Month	Total Output (Allowed Time i.e. **A/T**)	Total input (Time Taken i.e.**T/T**)	Time Saved (**T/S** = A/T - T/T)	**% of Earning** (T/S x 100%)
Oct-19	2806.00	1878.00	928.00	**49.41**
Nov-19	3215.00	2152.00	1063.00	**49.40**
Dec-19	2863.58	1916.00	947.58	49.46
Jan-20	3037.06	2032.00	1005.06	49.46
Jun-20	2867.50	1918.00	949.50	49.50
Jul-20	2977.00	1992.00	985.00	49.45
Aug-20	2185.00	1462.00	723.00	49.45
Sep-20	2796.00	1888.00	908.00	48.09

(C) MachineSection:

Month	Total Output (Allowed Time i.e. **A/T**)	Total input (Time Taken i.e.**T/T**)	Time Saved (**T/S** = A/T - T/T)	**% of Earning** (T/S x 100%)
Oct-19	740.00	544.00	196.00	**36.03**
Nov-19	988.41	698.00	290.41	**41.61**
Dec-19	851.00	592.00	259.00	43.75
Jan-20	1101.00	752.00	349.00	46.41
Jun-20	971.50	652.00	319.50	49.00
Jul-20	1076.80	728.00	348.80	47.91
Aug-20	511.00	346.00	165.00	47.69
Sep-20	472.00	320.00	152.00	47.50

(D) Store Section:

The nature of work performed by the section is not associated with the direct Outturn of Shop No. 34. Rather, the role of staff who are working at store section, is completely 'Indirect' / 'Supportive' in nature.
So, they are booked in Incentive as Essential Indirect Worker of respective section whose 'Time Taken' (T/T) is not accounted for the evaluation of Incentive.

2.17.0. It is seen in the above tables that Incentive Earning of 'General Armature Section', LRM (HA)]Sectionsare around 50% in every month. In case of 'Machine Section', Incentive earning are slightly less than 50% in some month. This is due to the fact that unlike the other two sections (i.e., 'General Armature Section' & 'LRM (HA)]) Sections' Machine Section has to cater Misc. nature of workload which always varies. Whereas, 'General Armature Section' & 'LRM (HA)]) Sections' has regular and pre-fixed workload to cater.

2.18.0. Thus, it is established that presently deployed man-power in the sections is performing with their highest level of efficiency.

Besides that, Study-team discussed with the sectional supervisors regarding the actuality of pending of job due to scarcity of competent man-power. It is learnt that the assigned jobs are complied by the sections timely / regularly without any hindrance. Thus, accumulation of pending job due to scarcity of technically trained worker is not occurred in Shop No. 34.

2.19.0. All the POH & other associated activities which are performed by Workshop's Direct Worker (DW) are quantified in terms of Man-Hrs. 'Allowed Time' (i.e., A/T) of each job /activity. The 'Allowed Time' (i.e., A/T) are evaluated by 'Rate Fixer' of 'Planning Department' through Time Study. While the activities of rest categories, i.e.,Essential Indirect workers, Ministerial Staff, JEs &SSEs are supporting / supervisory in nature and so, their job assignment could not be measured directly in that conventional way.

2.20.0. Hence, to measure performance of each of the section of Shop No.34, available monthly Man-Hrs., Section-wise 'Allowed Time' in man-Hrs. (Total Output), Time Taken (Total input), Time Saved, etc.are considered as an element for measuring the effectiveness of the deployed workforce as well as the usefulness of respective Shop no. 34, as a whole.

2.21.0. Keeping in mind of the above facts and figures, study team closely observes, analyse the section-wise activities and noticed that present section-wise MOR is a well-balanced team who are very efficiently managed the whole workload of Shop No. 34. But to meet-up any exigency and future additional workload at least 33% hike in section-wise MOR is the needed.

2.22.0. Study team left the issue on the competent authority, related to returning the incumbents of other shops to their respective parent cadre and coming back of Shop 34 staff to their mother shop.

2.23.0. Thus, study team closely observes, analyse the section-wise activities and keeping in mind of the same, proposed Bare Man-power requirement of the subject shop.

Section-Wise Proposed Bare Requirement of Man-Power after 33% enhancement is tabulated below –

SL No.	Name of Section	Present MOR	Allowance	Proposed Bare Requirement after considering 33% additional allowance on present MOR
1.	General Armature Section	**8**	33%	[8+(33% of 8)] i.e.10.64, R/O to **11**
2.	Light Rotating Machine (Heavy Armature) Section. [LRM (HA) Section]	**12**	33%	[12+(33% of 12)] 15.96, R/O to **16**
3.	Machine Section	**6**	33%	[6+(33% of 6)] 7.98, R/O to **8**
4.	Store Section	**2**	33%	[2+(33% of 2)] 2.66, R/O to **3**
Total		**28**	33%	**38**

2.24.0. Thus, Proposed Bare Man-Power requirement = 38 Posts

Evaluating Leave Reserve Posts, considering 12.5% Allowance of Bare Requirement i.e. 12.5% of 38 Posts.

Now, 12.5% of 38 Posts =4.75 Posts, Rounded off to 5 Posts

Hence, Leave Reserve = 5 Posts'

Thus, the Revised Man-Power of Shop No. 34 is evaluated as follows –

Proposed Revised Man-Power / Proposed SanctionedMan-Power

= Proposed Bare Man-Power Requirement + Leave Reserve

= 38 Posts + 5 Post

= 43 Posts.

2.25.0. Based on the above facts and figures, analysis of Study team, Revised staff position of Shop No. 34 /KPA, is proposed below –

Sl. No.	Shop No.	Present Sanc. Strength	Proposed Revised Sanc. Strength	Nos. of Posts to be declared as surplus	Recommended Surrender
1.	Shop No. 34	114 Posts	43 Posts	71 Posts	71 Posts

2.26.0. Recommendation:

Consequent upon the analysis made in the paras / tables above, it is recommended by the study team that the Revised Sanctioned Strength of Shop No. 34of Kanchrapara Workshop / Eastern Railway would be 43Posts as against the Present Sanctioned Strength of 114 Posts. Thus, the resulting (114 – 43) i.e.71 Posts are identified as Surplus and hence recommended for surrender.

CHAPTER-III

3.0.0. FINANCIAL APPRAISAL

3.1.0. As per recommendation made in Para 2.26.0., 71 posts of Shop No. 34 /KPA Workshop to be made surplus and financial savings thus achieved would be as under:

(Figs. In Rupees)

Level	GP	Mean pay	DA @ 17 %	Total Pay/staff/ month	Proposed surplus	Monthly savings	Annual savings
1	1,800.00	20,750.00	3,527.50	24,278.00	71	17,23,738.00	2,06,84,856.00

3.2.0. Thus, the annual financial savings against the surplus of 71 (Seventy-One) posts of Shop No. 34 / KPA Workshop as per 'Level 1 & Grade Pay Rs. 1800.00', vide 7th CPC Pay Matrixis worked out as **Rs. 2.07 Crore (Approx.)**