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ANALYSIS OF LINE BALANCING IN HVAC ASSEMBLY TO MINIMIZE THE CYCLE TIME

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Abstract:

Assembly line production is one of the widely used production systems. The problem of assembly line balancing deals with the minimization of the number of workstations and by reducing the cycle time.

Our objective was to reduce the idle time of the workstation and to minimize the number of workstation.

1. INTRODUCTION

Assembly line defines that manufacturing technique in which a product is carried by some form of mechanized conveyor among stations at which the various operations necessary to its assembly are performed. It is used to assemble quickly large numbers of a uniform product. Originally, assembly lines were developed for a cost-efficient mass production of standardized products, designed to exploit a high specialization of labor and the associated learning effects. In another hand when we used assembly line balancing (ALB) this makes efficient flow-line systems available for low volume assembly-to-order production and enables modern production strategies like mass customization. In practice, it is often desirable to smooth out the workload assignments and assign related tasks to the same workstation if possible

In practice, it is often desirable to smooth out the workload assignments and assign related tasks to the same workstation if possible. Thus, we used line balancing technique to achieve:

- The minimization of the number of
- workstations
- The minimization of cycle time
- The maximization of workload smoothness
- The maximization of work relatedness.

II OBJECTIVE

The aims and objectives of the present study are as follows: -

- To reduce production cost and improve productivity
- To determine number of feasible workstation.
- To identify the location of bottleneck and eliminate them.
- To determine machinery and equipment according to assembly mechanism.
- To equally distribute the workloads among workmen to the assembly line.
- To optimize the production functions through construction of mix form of automation assembly and manual assembly.
- To minimize the total amount of idle time and equivalently minimizing the number of operators to do a given amount of work at a given assembly line speed.

III METHODOLOGY

There are different methodologies evolving around for this technique Assembly Line Balancing. The Methodology which we use here is DMAIC process. The DMAIC process makes a substantial role in Assembly line balancing. Six Sigma's most common and The DMAIC five steps are,

Step 1. **DEFINE** the problem and scope the work effort of the project team.
Step 2.**IMPROVE** the problem by selecting a solution.
Step 3. **CONTROL** the improved process or product performance to ensure the target(s) are met**.**

IV DATA COLLECTION

1.GREASE AND LUBRICATION:

OPERATION-1					
S.NO	**DEFROS DOOR (5Nos)**	**TEMP DOOR (5Nos)**	**FLOOR DOOR (5Nos)**	**VENT DOOR (5Nos)**	**TOTAL (5Nos)**
1	33.79	44.83	35.90	35.78	150.30
2	31.19	43.57	33.15	34.23	142.14
3	32.31	44.21	34.72	35.63	146.87
4	34.43	42.11	33.63	35.32	145.49
5	33.02	43.81	35.21	36.21	148.25
AVERAGE					147.00
CYCLE TIME(SEC)					0.49

well-known methodology is its problem-solving DMAIC approach. This section overviews the methodology and its high-level requirements, given that the requirements define the appropriate deliverables, which dictates the tasks and the tool selection to aid in the task.

Step 4. **MEASURE** the current process or performance.
Step5.**ANALYZE** the current performance to isolate the problem.

2.DOOR AND CASE ASSEMBLY:

OPERATION-2						
S.NO	**FLOOR AND VENT DOOR**	**TEMP SHAFT AND TEMP DOOR**	**HEATER CASE LH**	**CLIPS**	**ARMS**	**TOTAL**
1	5.48	5.14	8.4	5.67	7.95	32.64
2	5.14	5.52	8.16	5.72	7.41	31.95
3	5.32	5.21	8.37	5.29	7.02	31.21
4	5.47	5.11	8.29	5.49	7.63	31.99
5	5.43	5.29	8.72	5.32	7.46	32.22
AVERAGE						**32.00**
CYCLE TIME(SEC)						**0.53**

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3.ARM AND CASE ASSEMBLY:

OPERATION-3					
S.NO	MOUNTING	FLOOR ARM	VENT ARM	TEMP DOOR	TOTAL
1	6.32	10.53	5.26	10.36	32.47
2	6.54	10.48	5.63	10.56	33.21
3	6.28	10.17	5.14	10.12	31.71
4	6.34	10.63	5.36	10.36	32.69
5	6.75	10.42	5.23	10.44	32.84
AVERAGE					31.00
CYCLE TIME(SEC)					0.51

4. CONSOLE COVER ASSEMBLY:

OPERATION-4				
S.NO	MOUNTING	TAPPING SCREWS	CONSOLE SEAL	TOTAL
1	2.41	23.70	7.26	33.37
2	2.52	23.73	7.39	33.64
3	2.37	23.67	7.51	33.55
4	2.73	23.59	7.14	33.46
5	2.62	23.49	7.21	33.32
AVERAGE				33
CYCLE TIME(SEC)				0.56

5.CAM HOLD:

OPERATION-5					
S.NO	LUBRICATING AND WASHER	FLOOR LEVER	LINK ROD	TEMP GEAR	TOTAL
1	18.16	1.57	1.33	4.75	21.06
2	18.09	1.50	1.31	4.67	20.9
3	18.21	1.47	1.39	4.70	21.07
4	18.21	1.46	1.30	4.81	20.97
5	18.29	1.39	1.41	4.76	21.09
AVERAGE					21.00
CYCLE TIME(SEC)					0.35

5.CAM SUPPORT:

OPERATION-5					
S.NO	LUBRICATING AND WASHER	FLOOR LEVER	LINK ROD	TEMP GEAR	TOTAL
1	18.16	1.57	1.33	4.75	21.06
2	18.09	1.50	1.31	4.67	20.9
3	18.21	1.47	1.39	4.70	21.07
4	18.21	1.46	1.30	4.81	20.97
5	18.29	1.39	1.41	4.76	21.09
AVERAGE					21.00
CYCLE TIME(SEC)					0.35

6.FINAL INSPECTION:

OPERATION-9			
S.NO	INSPECTING	CHECKING	TOTAL
1	9.26	39	48.26
2	9.45	39.29	48.74
3	9.51	39.5	49.01
4	9.41	39.43	48.84
5	9.37	40.51	49.88
AVERAGE			49
CYCLE TIME(SEC)			0.82

V ANALYSIS

Thus from the above data collection,the works of the different workstation is spliited to the nearby workstation.So that the number of workstation can be reduced and the efficiency can be increased.Due to the spliiting of work cycle time can be reduced.The cycle time reduction will result the higher production. From these tables, our analysis of line balancing is done. The cycle time has been reduced by splitting some of the works to nearby workstation. So that we can easily we can reduce the number of workstation. And also, it makes the efficiency higher level to make the production more effective. If the number of workstation is reduced, then the number of labours working will also be reduced. It will make the cost reduction of labour charge. Then the production will also be higher.

VI CONCLUSION

The key outcome of this project is the reduction in cycle time, reduction in number of workstations and to increase the production rate. Thus, we made this through obtaining cycle time in each workstation. The obtained cycle time considered for analysis to reduce the cycle time in the bottleneck area. The work is evenly distributed to all the workstation to increase the productivity and to reduce the cycle time and to increase the production rate. By this objective we can increase the cost efficient of the production line more valuable.

VII REFRENCE

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