iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 5 **Issue:** VII **Month of publication:** July 2017

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 5 Issue VII, July 2017- Available at www.ijraset.com

Analysis of Machining Layout using Standard Work Combination Table

Mahesh R Kale
Assistant Professor, Mechanical Engineering, Maharshi Parshuram College of Engineering, Velneshwar, Maharashtra, India

Abstract: ***Plant layout planning involves disposition of various facilities and services of plant layout within the area of site. Plant layout beings with the design of factory building and goes up to the location and movement of work table. All the facilities like equipments, raw materials, machinery, tools, workers etc. are at proper place. Also process optimisation is a major decision problem when drawing a balance between work distribution of workers during processing and maintaining requirement. The layout design generally depends on the products variety and the production volumes. There are various types of machine layouts, namely fixed product layout, process layout, product layout and cellular layout. Product layout is used for systems with high production volumes and a low variety of products.***
Keywords: Time Study, Data Collection, Process Flow, Idle Time

I. INTRODUCTION

The paper presents solving an industrial problem using Standard work combination table (SWCT) for analysis purpose. A analysis study was under taken to find out the efficiencies of the machines in the industry. The main aim is to find out most efficient arrangement of machines in the machine shop. By this table we can see the individual movements from one machine to other. It also helps to think how the efficiency can be improved.

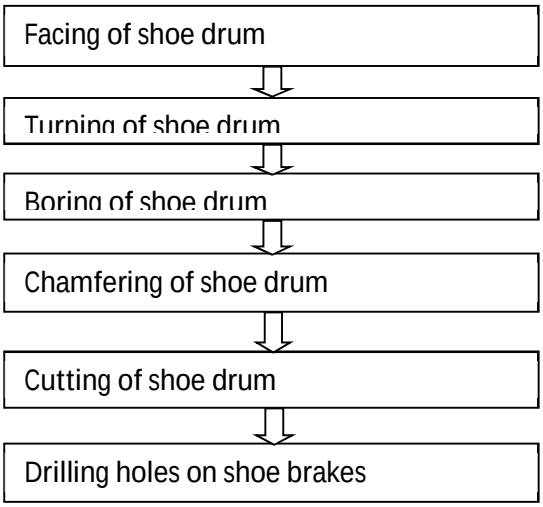
The standardized work combination table shows the combination of manual work time, walk time, and machine processing time for each operation in a production sequence. This form is a more precise process design tool than the Operator Balance Chart. It can be very helpful to identify the waste of waiting and overburden, and to confirm standard work-in-process.

II. CASE STUDY ON SHOE BRAKE MACHINING LINE

A) Layout of Machining Line

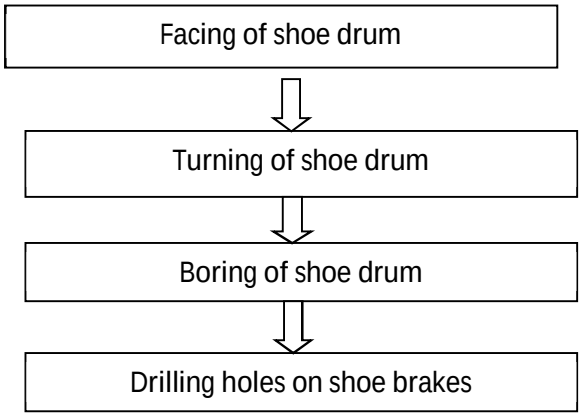
This study is based on the analysis of existing and modified layout. The existing layout is analysed by SWCT table and efficiency of each machine is analyzed. For this manual, machining, idle, waiting time of existing and modified machining line is calculated. Machining line is represented by using different symbols for different machining processes. These processes are connected by lines which show the flow of the product.

1) Flow Diagram of Existing Machining Line:



2) Flow Diagram of Modified Machining Line:

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 5 Issue VII, July 2017- Available at www.ijraset.com



3) *Modification in Shoe Brake Machining Fixture:* In existing machining line, a whole drum of shoe brake is cast. Then number of operations on shoe drum like facing, turning, boring, chamfering. Then separate four shoe brakes by cutting shoe drum in equal size. Then drilling of holes on each shoe brake. In existing process lots of loading, unloading time and wastage of material in cutting operation. To perform all the operation on four separately cast shoe the fixture is design. This fixture is mounted on lathe machine and on this fixture four shoe are clamped and to form proper curvature a metal guide is provided which helps to form a proper curvature and after that all operation are done on the four shoe at same time.

4) *Data Collection:*

Sr.No	Activity Description	Existing Time(min)	Modified Time(min)
1	Loading on Lathe	14	16
2	Clamping on lathe	20	18
3	Facing	46	36
4	Turning	22	15
5	Boring	85	80
6	Inspection	26	25
7	Chamfering	16	15
8	Unloading	16	11
9	Cutting shoe drum	30	0
10	Drilling	37	50
	Total	312	266

5) *Standard Work Combination Table:* The Standard work combination sheet combines human movement and machine movement based on takt time. This sheet distributes total cycle time by manual, automatic and walk time. Separate color lines are use for different time scale. It also shoes total available time, type of process and product information. It determine idle time, waiting time in machining process. For analysis of machining process, two separate standard work combination sheets are prepared. One for existing and another for modified machining line.

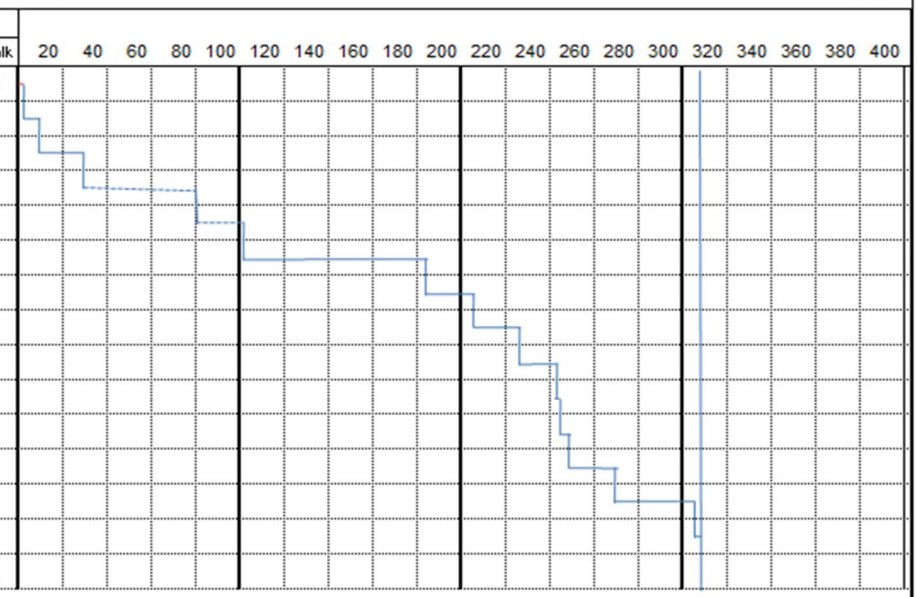
6) Standard Work Combination Table for Existing Machining Line:

Standard Work Combination Sheet (Existing Machining Line)

Process:Machining Process	Available time: 440 min	Takt Time: 74 min
Product:Shoe Brake	Cycle Time: 312 min	

Manual =
Automatic =
Walk =

#	Description of Operation Step	Time		
		Manual	Automatic	Walk
1	Take a crane for loading shoe drum			1
2	Load shoe drum on lathe	13		
3	Clamp shoe drum on lathe	20		
4	Facing on shoe drum		46	
5	Turning on shoe drum		22	
6	Boring of shoe drum	85		
7	Inspection of shoe drum	26		
8	Chamfering on shoe drum	16		
9	Declamp shoe drum from lathe	14		
10	Unloading of shoe drum	2		
11	Loading of shoe drum on cutting m/c	5		
12	Cutting of shoe drum	25		
13	Drilling on shoe drum	35		
14	Unloading of shoe brakes	2		
		243	68	1
			312	Totals



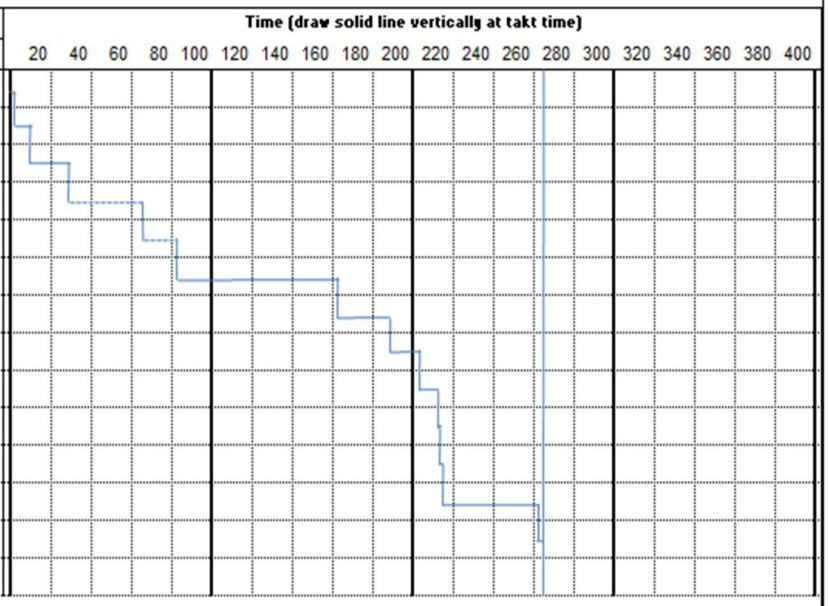
7) Standard Work Combination Table for Modified Machining Line:

Standard Work Combination Sheet (Modified Machining Line)

Process: Machining	Available Time: 440 min	Takt Time: 63 min
Product: Shoe Brake	Cycle Time : 266 min	

Manual =
Automatic =
Walk =

#	Description of Operation Step	Time (min)		
		Manual	Automatic	Walk
1	Take a crane for loading shoe brakes			1
2	Load shoe brakes on lathe	15		
3	Clamp shoe brakes on lathe	18		
4	Facing on shoe brakes		36	
5	Turning on shoe brakes		15	
6	Boring of shoe brakes	80		
7	Inspection of shoe brakes	25		
8	Chamfering on shoe brakes	15		
9	Declamp shoe brakes from lathe	10		
10	Unloading of shoe brakes	1		
11	Loading of shoe brakes on Drilling Base	2		
12	Drilling of shoe brake	46		
13	Unloading of shoe brakes after drilling	2		
		214	51	1
			266	Totals



III. PRODUCTIVITY CALCULATION

A. For Existing Shoe Brake Machining Line

Total available time per shift = 440 min
Total time required to finish four brake shoes = 312 min
Total time required to finish one brake shoe = 78 min
Number of brake shoe finished per shift = (440/78)
= 5.64 = 6
Man hours per shift= (total available time x number of workers) /60
= (440 x 4)/60
= 29.33
= 30
Productivity = (number of brake shoe per shift / man hours per shift) x 100
= (6/30) x 100
= 20 %

B. For Proposed Shoe Brake Machining Line

Total available time per shift = 440 min
Total time required to finish four brake shoes = 266 min
Total time required to finish one brake shoe = 67 min
Number of brake shoe finished per shift = (440/67)
= 6.56 = 7
Man hours per shift= (total available time x number of workers) /60
= (440 x 3)/60
= 22
Productivity = (number of brake shoe per shift / man hours per shift) x 100
= (7/22) x 100
= 31.81 = 32 %

IV. CONCLUSIONS

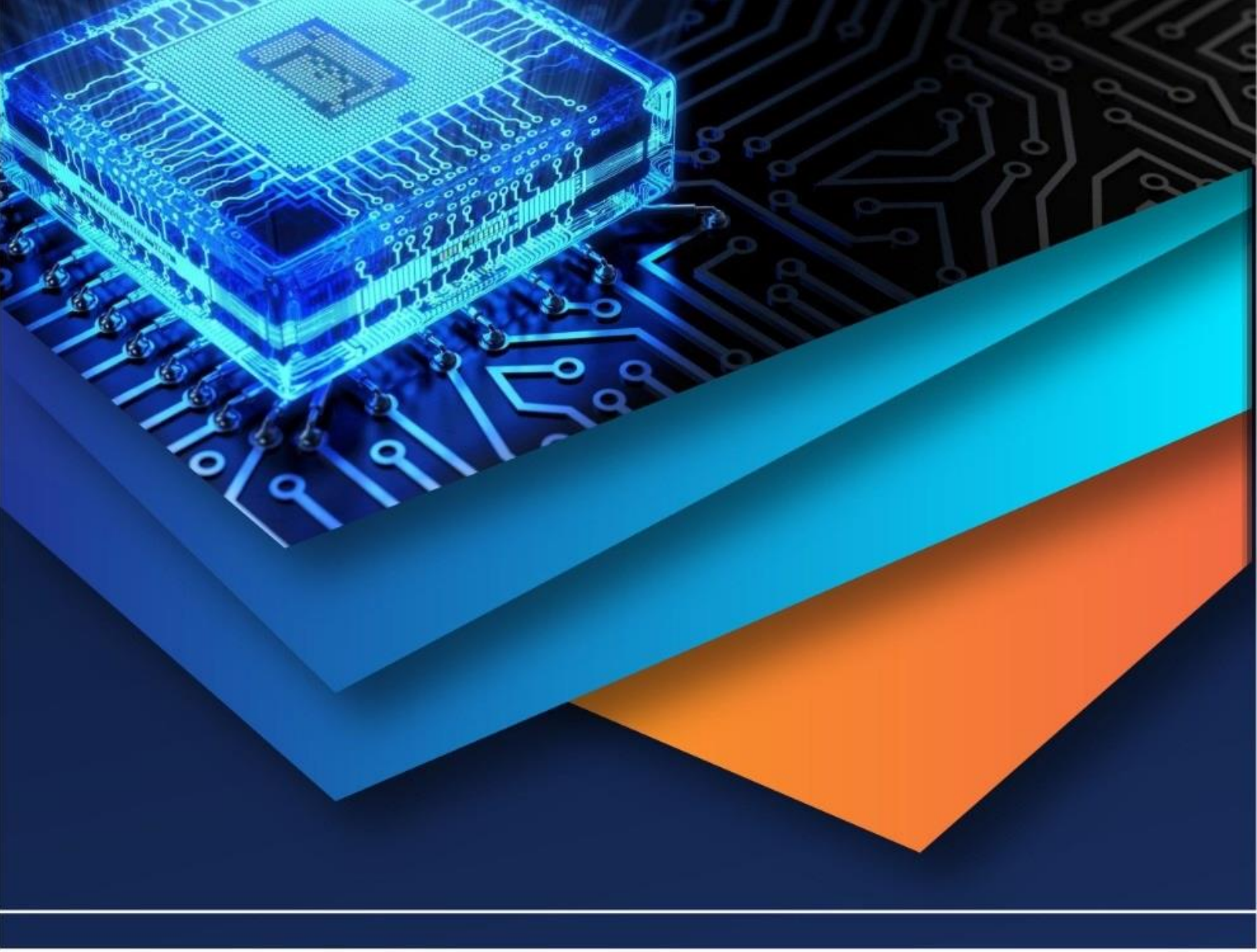
A. Number of workers reduced by 1 i.e. from 4 to 3.
B. Number of shoe brake produced per shift is increased by one.
C. Total productivity of shoe brake machining line is increase by 12 %.

V. ACKNOWLEDGMENT

I thank my post graduate project guide Prof. V. Jadhav. Also I thank my friends who helps in collection of project data. My students helps for data collection from Pethe organization.

REFERENCES

[1] Surekha S, R V Praveena Gowda and Manoj Kulkarni, “Standardized Work: An Important Principle Implemented in Manufacturing Industry”, International Journal of Management Research and Business Strategy, Volume 2, April 2013.
[2] V. N. Borikar, Dr. K. H. Inamdar, “Improving Productivity for Engine Crank Case Machining Line Using TPS Techniques and Simulation, International Journal of Engineering Research & Technology (IJERT), Volume 1, Issue 9, November 2012.
[3] N. Sathiya Narayanan, M. Anandha Raj, T. Ananth, S. Aravindh2, B. Karthik, “Lean Manufacturing Techniques for Effective Utilization of Man Power in Engine Accessory Production Line, International Journal of Innovative Research in Science, Engineering and Technology, Volume 5, Issue 4, April 2016



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY