International Journal of Advance Industrial Engineering
E-ISSN 2320 –5539

Available at http://inpressco.com/category/ijaie/

Research Article

Work Estimation Criteria for Skeleton Preparation

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Accepted 10 Sept 2016, Available online 17 Sept 2016, **Vol.4, No.3 (Sept 2016)**

Abstract

Work estimation in terms of time is very important aspect for a project based company to schedule manpower and other resources. Work estimation model is prepared for Skeleton Preparation activity. Data is collected using time study.

Keywords*: Time Study, estimation*

1. Introduction

Skeleton is the structure made up of Tube Sheet, Tie rods and Baffle plates. Baffle plates are inserted through sets of tie rods attached at one end of tube sheet to make the structure. Following are the activities involved making a skeleton

Tube Sheet Erection with Tie Rods→Deburring Baffles→Arrange Baffles→ Weld Baffles to tie Rods

2. Methodology

A. Data for each activity is collected using time study

A.1 Tube Sheet Erection

The tube sheet is kept in upright vertical plane on a base using temporary supports, then the tie rods are inserted. Using analytical estimation and shop floor observation it is estimated that in 120 min the whole operation could be completed.

A.2 Deburring Baffles

After drilling holes on baffles it is very important to de-burr the baffle plates to prevent tube form getting damaged. This is done by grinding the baffle plates. Using time study a grinding rate 0.286 (m^2/min) was established so that time required for grinding different size baffles can be calculated.

A. Arrange Baffles

As per drawing baffles are manually picked and inserted through tie rod to its position by sliding. Using time study a standard time of 15.44 min/baffle of diameter 1500 mm is established.

A. Weld Baffle to tie rod

Each baffle hole is welded with tie rod to provide strength and restrict the movement of baffle. From time study 3.81 standard min per weld joint is established.

B. After this the design data is applied to standard data to calculate the total time. The studied skeleton had 16 numbers of Baffles of diameter 1500 mm and 6697 mm length total length.

3. Results

Table 1 Summary

Work Order		ABCD
Equipment		XYZ
No. of Baffles		16
Size of Baffle		Ø 1500 mm
Total length of skeleton		6697 mm
Total Baffle are to grind		365299.22 m^2
Total Weld joints		104
Sr. No.	Element	Standard Time (min)
1	Tube Sheet Erection	120
2	Deburring Baffle	1277.27
3	Arrange Baffles	247.04
4.	Weld Baffle to tie rod	396.24
Total Time		2040.55

This data will be suitable for estimation of skeleton with baffle size in the range 1500-2000 mm. Estimation criteria is min per length of skeleton and number of baffles.

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Table 2 Estimation Criteria for skeleton preparation

Skeleton Preparation					
Following Steps are considered for skeleton preparation 1] Tube Sheet Erection 2] De-burring Baffles 3] Arrange Baffles 4] Weld Baffles to Tie Rod					
Sr. No.	Process	No. of Baffles	Baffle Size	Skeleton length	Estimation Criteria
		No.	mm	mm	$\frac{Min}{skeleton\ length,\ No.of\ Baffle}$
1.	Without Spacer	16	1500	6697	0.019

$$Estimation\ Criteria = \frac{Total\ Time}{Skeleton\ Length,\ Number\ of\ Baffle}$$

4. Discussion

To estimate time required for skeleton preparation having baffle size in the range of 1500-2000 mm, multiply the figure 0.019 with skeleton length and number of baffles.

Table 3 Estimated Time

Skeleton Preparation					
Sr. No.	Process	No. of Baffles	Baffle Size	Skeleton length	Estimated Time
		No.	mm	mm	min
1.	Without Spacer	23	1500	8000	3496

Hence 3496 min will be required to prepare a skeleton of 8000 mm length and 23 baffles.

Conclusion

Estimation based on time study will help to set accurate and smooth project schedule, which ultimately help to schedule resource and material.

Acknowledgment

We would like to thank Mr. S.K. Joshi for constant support and guidance for this paper.

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