International Journal of Research in Mechanical, Mechatronics and Automobile Engineering (IJRMMAE) Volume 4 Issue 2 – www.ijrmmae.in – Pages 1-4

CYCLE TIME REDUCTION IN DUMMY PIECE PREPARATION BY MULTI ROD AND TUBE CUTTING FIXTURE

G.D.Sivakumar[1],K.Srinivasan[2], A.Imran[2], A.Michael Shekinth[2]
[1]UG Professor, Department Of Mechanical Engineering, Sethu Institute Of Technology
[2]UG Scholors,Department Of Mechanical Engineering, Sethu Institute Of Technology,
Virudhunagar-626115-TN-India.

Abstract—In a boiler, there are many heating systems like Water wall, Super heater, Re-heater, Economizer, drainer. These systems are having separate inlet and outlet. In boilers, Headers are used to collect and distribute water or steam from one heating surface to another.Round flat piece is called dummy. It is welded in stub for plug the Open ended stub during hydro test. Dummy piece preparation is done in the saw cutting, band saw and lathe machine in the building 1.To ensure the quality of the header, hydro test is carried out in shop by 1.5times of design pressure. During hydro test operation all the open ended stubs are closed by using dummy. After hydro test removed the dummy pieces.On time delivery is very difficult. To meet this requirement dummy piece is required in large quantity. So multi rod and tube cutting fixture is developed to reduce the cycle time.

INTRODUCTION

Header is one of the major part of boiler. Header is defined as a pipe, cylinder or tubular chamber with number of side outlet. Header is a junction in which water or steam or mixture of water and steam collected at one side and distributed at other side.Numerous stub are mounted on the surrounding of the header stub is used to transfer the water or steam or mixture of water and steam from one end to other end. In header various number of test has to be supervision one of the method is hydro testing method. In hydro test has to be performed by closing all the open end pressuring the header with water at a test pressure of 1.5 times the design.To proceed the hydro test, we are closing open side of the stub by using dummy pieces. Round flat piece material has been used by dummy. The dummy piece is made up of parent material. After completing the hydro test, dummy piece has to be removed.After detailed interaction and brain storming, implemented the new method of multi rod and tube cutting fixture for improving the rate of production of the dummy pieces. This method is used to reduce work effect and cycle time for completion of the header.

ABOUT THE EXISTNG PROJECT

Header is a major component of boiler and different types of header manufactured such as super heater header, re-heater header, economizer header, water wall header, drain header. Stub is fixed on the header for transfer the water or steam from one end to another end. For the hydro test to be carried out, stubs are closed by dummy pieces. After completing hydro test dummy pieces has to be removed.

Figure A. Old method

B. PROBLEM EXPERIENCED

Dummy pieces cutting time consumption is more.
Productivity of dummy pieces is less.
Single dummy pieces was cut at a time.
This method is complicated.
In dummy cutting, we are using saw cutting, band saw cutting, and lathe.

C. IMPACT OF THE PROBLEM

More cycle time for completion of dummy piece.
Fatigue to the operator.
Unsafe working method.
It required more number of shift.
Power consumption is more.

D. SOLUTION SUGGESTED

It is suggest to develop a new method of dummy piece preparation by multi rod and tube cutting fixture

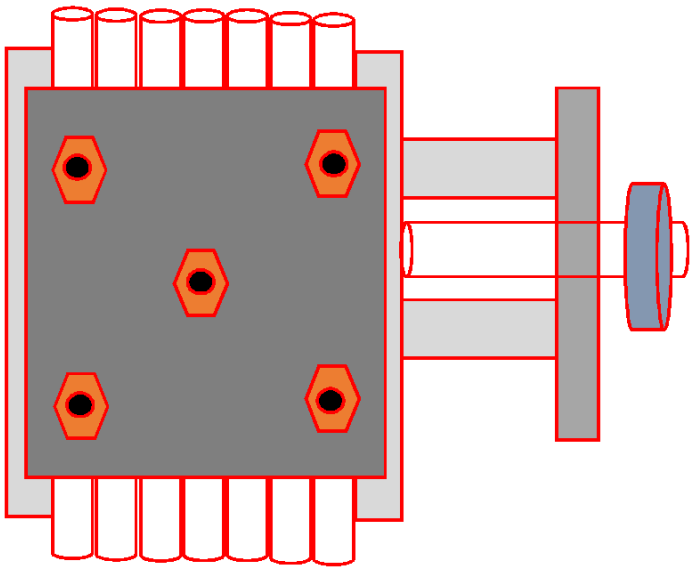


Figure B. Design of fixture

Invention of multi rod and tube cutting fixture is to reduce the cycle time of dummy piece preparation and increase productivity.After used the new fabricated rod and tubes cutting fixture. The output is increased due to multiple cutting rod or tube setting time is reduced, we are time on delivered the dummy piece and tubes. Internal receiver were satisfactory.

B. Assembly

In rod tube cutting fixture consist of up and down adjusting screw, lock nut, spring lock, serrated jaw piece for right holding and dummy rod piece collecting box. In this method, we fitted two jaws one is fixed jaw and other is movable jaw. In top of the fixture, adjustable screw square thread stopper is fixed. It is used to up and down motion adjustment. In back side of the fixture, adjustable screw square thread stopped is fixture it is used to forward and backward motion adjustment. These square thread withstand high load. So we can used square thread as a stopper it is the lowest friction and most efficient thread form. In bottom of the fixture, rod and tube piece collection box is fixed. It is used to collect the dummy pieces. In this method, we use band saw cutting blade. It is used to cut the rod and tube. By using this multi rod and tube cutting fixture, we reduce the cycle time of dummy pieces preparation and increase the productivity.

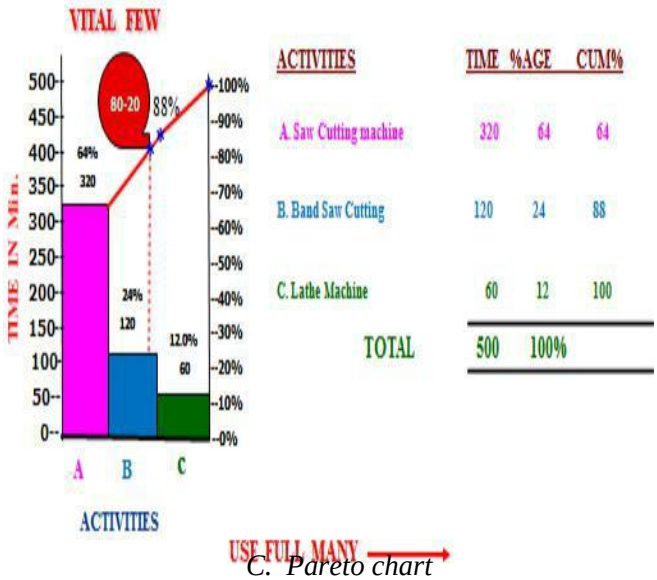
In our team prepare the datasheet after fabricated the new dummy piece and tube cutting fixture used in the Saw cutting machine Time study for 10Nos. of dummy piece and tubes cutting.

Table A. Time study without collecting box.

DATA SHEET

Sl. No.	Job dia.	A Min	B Min	C Min	D Min	E Min	Avg. For 10Nos cutting
1	31	3.0	3.0	3.0	0.5	3.0	12.5
2	34	3.5	3.0	3.0	0.5	3.0	13.0
3	37	4.0	3.0	3.0	0.5	3.0	13.5
4	41	4.5	3.0	3.0	0.5	3.0	14.0
5	44	5.0	3.0	3.0	0.5	3.0	14.5
6	47	5.5	3.0	3.0	0.5	3.0	15.0

A. Dummy cutting time B. Rod clamping C. Rod unclamping D. Rod setting time E. Dummy piece collecting time.



C. Pareto chart

DATA SHEET

In a Saw cutting machine after provided the collecting box were take the Time study for 10Nos. of dummy piece and tubes cutting. Extra activity of dummy piece collecting time is eliminated.

Table B. Time study with collecting box

Sl. No.	Job dia.	A Min	B Min	C Min	D Min	Average For 10Nos cutting
1	31	3.0	3.0	3.0	0.5	9.5
2	34	3.5	3.0	3.0	0.5	10.0
3	37	4.0	3.0	3.0	0.5	10.5
4	41	4.5	3.0	3.0	0.5	11.0
5	44	5.0	3.0	3.0	0.5	11.5
6	47	5.5	3.0	3.0	0.5	12.0

Dummy cutting time B. Rod clamping C. Rod unclamping D. Rod setting time

D. Benefits

Productivity improvement – the time is saved for ten numbers cutting (from 115min. to 9.5min) 91.74%

Improvement in working conditions.

IV. COMPARISON		
Sl.	Before	After
1	More cutting time (115min per 10 nos.)	Cutting time is reduced (9.5 min per 10 nos.)
2	We are using saw cutting, band saw and lathe for 15000nos. of dummy cutting	saw cutting machine only used for 15000nos.of dummy cutting
3	Very less output (40to60nos .per shift)	Output increased (400to600nos.per shift)
4	15000nos.dummy preparation required 300 shifts.	15000nos. dummy preparation required 37.5 shifts only.
5	Fatigue to operator	No fatigue to operator
6	Complicated method	Simplified method
7	Unsafe working condition	Safety in ensured

AKNOWLEDGMENT

The authors thank the Bharat Heavy Limited and Sethu Institute of Technology for supporting this research. And great thanks to Production Engineer Vidyasagar Gurugubelli and Assistant Professor Amirtharaj for the constant support and assistance provided.

REFERENCES

1. Mordike B.L. and Ebert T. “Magnesium: Properties – applications – potential”, Matertials Science and Engineering A, 2001, 302(1), pp. 37-45.
2. Q.C. Jiang, H.Y. Wang, B.X. Ma, Y. Wang, F. Zhao, “Fabrication of B4C particulate reinforced magnesium matrix composite by powder metallurgy”, Journal of Alloys and Compounds, 2005, 386, pp. 177-181.
3. P. Narayanasamy, N. Selvakumar, P. Balasundar, “Effect of hybridizing MoS2 on the tribological behavior of Mg-TiC composites, Indian institute of metals 2015.
4. N. Selvakumar, P. Narayanasamy, “Optimization and wetght fraction of MoS2 on the tribological behavior of Mg-TiC- MoS2 composites”, Tribology Transactions 2015.
5. S.F. Hassan, M. Gupta, “Development of high performance magnesium nano-composites using nano Al2O3 as reinforcement, Matertials Science and Engineering A, 2005, 392, pp. 163-168.