

Design and Analysis of Fixture Bracket for Engine Assembly Line

Gaurav Bhusari

M. Tech Student

*Department of Mechanical Engineering
ACET, Nagpur, Maharashtra, India*

Prof. M. Sohail Pervez

Assistant Professor

*Department of Mechanical Engineering
ACET, Nagpur, Maharashtra, India*

Abstract

The present proposed work in this paper aims at developing the easy to machine fixture which not only enhances the production rate but also reduces machining time. Presently in automobile industry, the production line for engine assembly is done in conventional method, due to which production takes too much time to produce a product. Sometimes it doesn't fulfill the demand due to lack of production technique and delays. We have proposed a design of a fixture bracket which will be very useful for production of engine in production line. With the help of this fixture bracket, the assembling of the engine block with its sub-parts will be quite easier than the conventional method. Also we calculate the strength equations and fatigue analysis on the fixture bracket for the safety of the operator and production system.

Keywords: Fixture Bracket, Strength Analysis, Fatigue Analysis, FEA, mounting, etc...

I. INTRODUCTION

Automobile Industry is one of the biggest and fast growing industries. The most important part of any automobile industry is the power generation & driver unit known as "Engine". It consists of integral assembly of various parts critically organized in one casing.

Conventional method of production/ manufacturing is adopted in industry while assembling engine block, which takes most of the working time only in fixing & re-fixing the block. Many such components are piston, piston ring, crankshaft, cylinder head, cylinder line, piston carrier, connecting rod, etc

The present work proposes such a fixture bracket which will help in assembling the engine with ease as well as it will reduce the change over time of the machining along with reduced fatigue of operator. Also with the help of this fixture bracket, production rate will also improve.

II. LITERATURE REVIEW

Umesh S.Ghorpade¹, D.S.Chavan², Vinay Patil³, Mahendra Gaikwad⁴ – The automotive engine mounting systems are very important for vehicle performance. Early the engine, mounting improvement is checked and analyzed without sample of vehicle authorization. For frame support engine bracket is to be designed. Due to continue vibration and fatigue, the structural failure and high stressed are induced. So, investigation is done in structural analysis and its dynamic behavior. With the help of Finite Element Analysis [FEA] the engine bracket natural frequency is carried out.

Ashish Y.Dakhole¹ and M.S.Tufail²- For automated Banjo beam/ Case axle cleaning machine, there are 17 types of components are used to cleaned, dry and proceed for painting. Due to the special purpose of machine the manufacturing of case axle made 17 similar types of components. Components consider as similar standard with each component having different shape and size are universally used.

With the help of cycle time the multistage processing is done. At every station provides sensors to conveyorised fixture for Banjo Beam. PLC programmed is used for operation cycles.

Pravin Gudale¹ and Dr. Vinayak Naik²- Failure Modes and Effects Analysis (FMEA) is used to analyzed the reliability in development cycle, due to these enhancing the reliability with the help of design. For engine cylinder block, the development of semi-automatic fixture is designed in the paper.

The issue which is related to engine block fixture is resolved with methodology FMEA, the priority risk number is identified and minimized. Due to these cost saving in term of quality improvement is done.

Mr. Pramod Walunje¹ and Prof. V.K.Kurkute²- The engine is one of the most important of the automobile vehicle. Sports car needs high performance which is done by using bracket, due to which improving in comfort zone of driver. The engine bracket is very important component of framework of vehicle chassis. It also improves the efficiency of the vehicle, if the engine bracket is light weight. The objective of the paper is to highlight that how the light weight bracket improve efficiency.

Sahil Naghate¹ and Sandeep Patil²- For reducing noise, vibrations and harshness engine mounting is used and also it allows comfort also. The main function of an engine mounting bracket is to balance the vehicle chassis for control motion. In paper, modeling and analysis of engine mounting bracket is done with different material component. Analysis is done on square cross-section in form of static and modal analysis. Also weight reduction is due component to standard material engine alloy material and also stresses is withstand.

III. IDENTIFIED GAPS IN LITERATURE

In most of the recent journals and papers published, there is a concept related with the engine mounting, in which vibration and stress analysis is done. In the present proposed work, we intend to develop the efficient, economical and better method of production. In recent paper very limited work is done in engine block production technique. So, the involvement of this fixture production technique will be very helpful for production firms and departments in particular.

IV. PROBLEM FORMULATION

Automobile Industry is one of biggest and rapidly growing industry having engine as a power generation unit i.e. heart of the automobile industry. In engine block many components are being assembled such as piston, piston ring, crankshaft, cylinder head, cylinder line, piston carrier, connecting rod, etc. During assembly, substations have been allotted with specific component to be oriented at its location. The time lag can be well managed during tool changing and orientation which is very difficult in the conventional method.

Also in case of failure of the conventional method, it may cause serious accidents. So, it is utmost required to design and develop a safe & fast responsive fixture.

V. OBJECTIVE

- 1) To increase production rate of the engine assembly by providing easy to handle fixtures during machining.
- 2) Strength and Fatigue analysis of designed fixture bracket will be carried out.

VI. RESEARCH METHODOLOGY

The proposed fixture bracket is to be designed and analyzed using CAD & FEA software for its strength. This bracket is used to lift the engine block so that it can facilitate the assembly on various components in different orientation. Also it involves optimization and life prediction of the bracket.

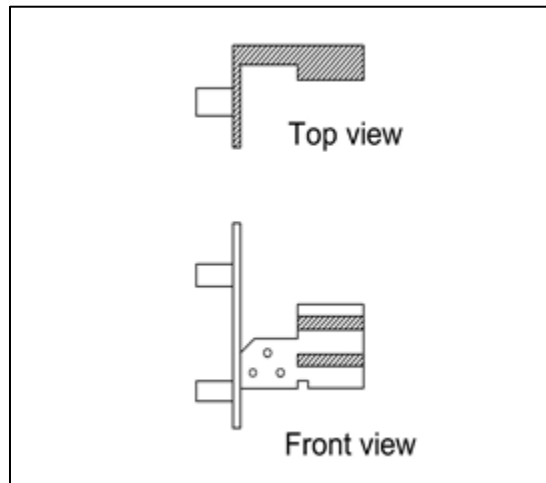


Fig. 1: Views of Fixture Bracket



Fig. 2: Engine Block

VII. CONCLUSION

With the help of this fixture bracket, we will be able to produce more engines on production line with its sub-parts assembled properly & we provide the safety for the worker with the analysis of strength and fatigue.

ACKNOWLEDGMENTS

I am thankful to Prof.M.Sohail Pervez, my guide for his encouragement and valuable technical briefs. I would also thank to all my friends who had helped and supported me all the time.

Last but not least, the backbone of my success and confidence lies solely on the blessings of my parents.

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