

A Review : Design And Analysis of Welding Fixture for the Rack and Pinion Assembly

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ABSTRACT

In most of manufacturing industry used for assembly of component for used the welding fixture. The fixtures are the important part of the welding as fixtures are used in manufacturing of different products during welding to hold the different parts of that respective product. Fixture having direct impact for the productivity and quality of product. welding fixture are design for the component which have difficult to weld. In normal way welding of different parts of component not possible for without holding device. The welding fixture are important holding device. The number of parts to be welded in proper position in fixture and tightened. When the fixture are holding work piece for produced by the welding stress. The proposes a design and analysis approach in fixture of sheet metal assemblies for Cross member Rear Lower Wishbone component. The design of an assembly fixture for a particular tail cone has been completed convenient to the existing locating principles. The design of welding fixture and component using for Pro-E and CAD software. using the Finite Element Analysis (FEA) by using ANSYS software that provides best output within few seconds

Keywords : Design, Analysis, Welding Fixture, Assembly of Cross Member Rear Lower Wishbone Component

I. INTRODUCTION

In these troubling economic times, companies are trying to find methods to optimize the production and utilization of their assets. Now more than ever, companies are trying to manufacture and fabricate their goods as cheaply as possible by maintaining high production variability and sustaining low error counts. Additionally, companies are asking younger, less experienced workers to manage projects that are typically selected for more experienced engineers to maintain the knowledge, while reducing the number of workers. The sudden shift in industry has caused additional focus on cost cutting devices and tools that facilitate the acquisition of and maintenance of company specific knowledge and experience from engineer to engineer. An example of a cost cutting device is a fixture. A fixture is a tool that is used to accurately locate and hold a work-piece in a manufacturing or fabrication process. Fixtures can have applications in machining, assembly, and turning. Fixtures are made for easy loading and unloading and

guarantee that a work-piece can be held in the same location repeatedly with minimal variation. The time needed for the fabrication process is reduced and costs are lowered by diminishing the need of potential rework on parts. The focus of this thesis is on welding fixtures which are a type of assembly fixture. These fixtures are made specifically to hold multiple parts together, allow adequate tool passage, resist high heat and sputter, permit passage of weld runoff, and in some cases conduct electricity and provide grounding. Fixture design has much to do with experience, which the younger engineers generally have been unable to acquire. It can take engineers many years to learn the nuances of the craft. Fixture design can be divided into four major steps, setup planning, fixture planning, fixture unit design and verification. These steps can be generalized as analyze the part, define suitable locating and clamping points, identify tooling and environmental requirements, and create a fixture to satisfy criteria.

A fixture is a device for locating, holding and supporting a work-piece during a manufacturing

operation. This consists of locators, clamps, supports, and fixture body. Fixtures are essential elements of production processes as they are required in most of the automated manufacturing, inspection, and assembly operations. Fixtures must correctly locate a work-piece in a given orientation with respect to a welding torch or measuring device, or with respect to another component. Whenever any component is in space it will have 6 degrees of freedom and for correct location of that component it is required to restrict those 6 degrees of freedom. These degrees of freedom can be restricted by 3-2-1 location system. Such location must be invariant in the sense that the devices must clamp and secure the work-piece in that location for the particular processing operation.

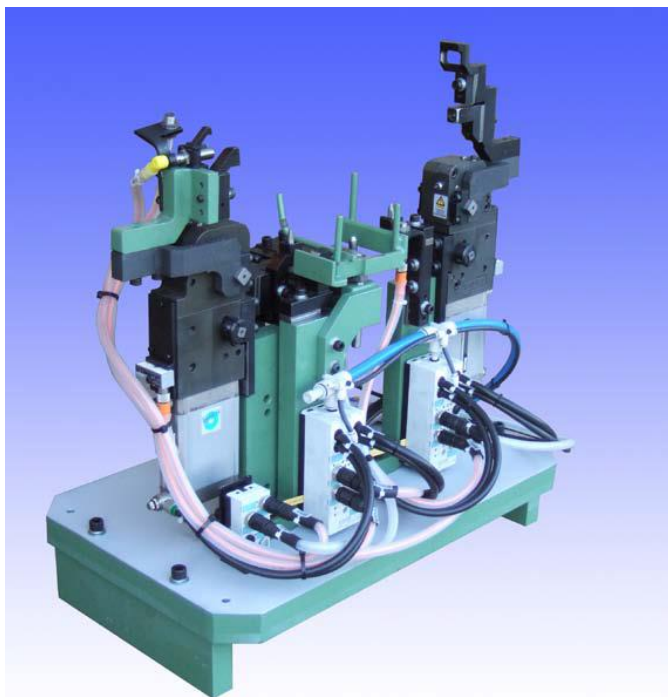


Figure 1. Assembly Welding Fixture

II. LITERATURE REVIEW

Naveen A M, V A Girisha, Pruthvi H M

They have Studied the Design And Analysis Of Welding Fixture For Motor Case Assembly In this paper for motor case assembly is approximately about 4 meter length of assembly .which have welded for the brackets and ducts on the motor case assembly. the required tolerances on the motor case assembly the shaft/support pipe is designed as a main part of the welding fixture and the different parts are mounted on this shaft

/support pipe. The analysis is carried out to have a optimum shaft dimension it's minimum deflection they have a proper clamping in fixture all parts of motor case assembly. All the analysis part is carried out using CATIA V5 R17 and All the modeling of the components has been carried out using UNIGRAPHICS NX8.0. The optimum shaft/support pipe of outer diameter 200mm and 184mm inner diameter has been derived from the theoretical calculations and it's same subjected to analysis for the stress and deflection error was found to be 5.6% and 4.94% respectively

Kalpesh Khetani, Jafar Shah, Vishal Patel Their Paper gave study about design and thermal stress analysis of welding fixture of a brake pedal of tractor by using ASNSYS Workbench 14.5 From results of the thermal analysis they have observed by the graph. They found that the temperature Variation with respective time and also observed by thermal stresses are distributed around welding points.

Omkar Joshi, Dr. Arunkumar

Due to Studied the Design And Analysis Of Welding Fixture For Orbital Welding Machine. In this paper fixture required Specialize to accurately hold the work-piece during the welding operation. The Fixture designed hold job and rotate the job at required Speed. The reduce cycle time and operator labor while increasing functionality. The analysis done by transmitting shaft Stress analysis. The design solve problem and new calculation value are find out.

Yogesh Ingale, Kuldip Rade, Nitin Bhalerao, Dr. kailasnath Suta

In this paper, they have Design and Analysis of Welding Fixture for Inlet Header of Shell and Tube Heat Exchanger, Design, modeling and analysis of welding fixture components for inlet header of shell and tube heat exchanger. The V locators, Clamp Wheel, Side Bracket and supporting plates are used for locating, clamping the inlet header and to get dimensional accuracy and constrain Degree of Freedom (DOF) completely. Modeling of fixture is done by using Creo 2.0 software. OptiStruct solver software is used to perform FEA simulation and to calculate vibration characteristics which are validated by FFT Analyser. Multiple mode shapes with natural frequencies are plot by using FFT Analyser. Fixture Welding Process for inlet header reduces 75% less time for welding and it

also shows that increase dimensional accuracy of fixture welding is higher than manual welding.

Jigar D Suthar, K.M Patel, Sanjay G Luhana

In this paper Design and analysis of fixture for welding an exhaust impeller. The Structure of impeller itself as fixture and which has been resulted in the reduction of distortion producing welding. The modeling work done by using AUTO CAD, PRO-E, Solid work software and analysis part has been done using ANSYS workbench. Unbalance mass for for the impeller has been reduces for 44 kg for the new design from 100g for existing design. The manufacturing lead time is less in fixtureless design because of less assembly time and less welding .The CFD analysis done by impeller for that in improper streamline

Chetan D. Borse, Prasad V. Thete, Ravi P. Vishwakarma, Jainendrakumar S. Yadav

In This paper the design and analysis of the welding fixture for the body of a stone crusher. Fixtures are used to securely locate and support the work, ensuring that all parts produced using the fixture will maintain conformity and interchange ability. The material used in the manufacture of different parts of body of a stone crusher is Mild steel which is one of the most commonly used materials in the field of fabrication. In weld fixture by using UNIGRAPHICS NX8.0 software and the Finite Element Analysis (FEA) by using ANSYS software that provides best output within few seconds. Finally the stress concentration and deformation results are presented in this document. The sequence of the welding operations and is found to be one of the optimum sequence in this crusher body welding.

Vaishak bhandary M, Sudeep N S, and Naveenakrishna P V

Due to Study of Design and Analysis of Robot Full Welding Fixture for Front Chassis of Wheel Loader. In machining fixtures, minimizing work piece deformation due to clamping and cutting forces is essential to maintain the machining accuracy. The fixture set up for component is done manually. For that more cycle time required for loading and unloading the material. So, there is need to develop system which can help in improving productivity and time. Fixtures reduce operation time and increases productivity and high quality of operation is possible. Analysis is done on

modified model to find stress and deflection using hyper mesh software.

A. M. Mhaske, R. M. Metkar, S. D. Hiwase

In This paper also introduces the Finite Element Analysis of Loadall Inner Boom using ANSYS 14 software. The geometry of Loadall Inner Boom is prepared in CATIA software as per the design considerations. After generating 3D model in CATIA software, convert model in IGES and STEP format and analysesd it using ANSYS 14 software Finite Element Analysis (FEA) has been realized in simulating the assembling process in order to predict the possible variation of the interested feature on a complex assembly due to deformations.

C. A. Kubade , Dr. S.V. Patil , Mr. V. P. Patil

They have present that, Design and Analysis of Welding Fixture for Automotive Component using FEA The Materials are selected as per functional requirements and based on previous designs. The general arrangement is made and fixture is designed with the use of analytical method which includes pneumatic cylinder selection, L-shaped bracket design and positioning of units. Power clamps and LM guides are selected as per the fixture requirements. The design is verified with the use of FE analysis for strength criteria of material and is found under safety limits The design is safe as per strength criteria as all the stress levels are below the allowable limit of stress. The percentage error values of analytical and FEA design varies within the range of 5% to 15%; which is acceptable

III. CONCLUSION

A lots of research, work & Study have been done by many researchers in the field of design and analysis of Welding Fixture. The many authors have given various methods of design and different analysis of welding fixture in manufacturing industry. Due to time reduction and essay to assemble of manufacture component in accurate dimension. The assembly of welding component on fixture which have affect by welding thermal Stress and clamp bending stress on sheet metal part of automobile industry.

IV. REFERENCES

- [1]. Jigar D Suthar, K.M Patel, Sanjay G Luhana “Design and analysis of fixture for welding an exhaust impeller”International journal of Engineering ScienceDirect and Technology , vol. 51 (2013) 514 – 519
- [2]. Naveen A M, V A Girisha, Pruthvi H M “Design And Analysis Of Welding Fixture For Motor Case Assembly” On IJMPE, ISSN: 2320-2092, Volume- 2, Issue-8, Aug.-2014
- [3]. Kalpesh Khetani, Jafar Shah, Vishal Patel “ Design and Thermal Stress Analysis of Welding Fixture of a Brake Pedal” IJRMEE ISSN: 2349-7947 Volume: 2 Issue: 5 029 – 032,May-2015.
- [4]. Chetan D. Borse, Prasad V. Thete, Ravi P. Vishwakarma, Jainendrakumar S. Yadav “ Design And Analysis Of Fixture For A Stone Crusher Body” On IJRET eISSN: 2319-1163 | pISSN: 2321-7308, Volume: 04 Issue: 06 | June-2015.
- [5]. A. M. Mhaske, R. M. Metkar, S. D. Hiwase “Design and Analysis of Welding Fixture for Tacking and Welding of Inner Boom of Loadall Handler” On IJRMET, ISSN : 2249-5762, Vol. 5, Issue 2 ,May - Oct 2015
- [6]. Omkar Joshi, Dr. Arunkumar “ Design And Analysis Of Welding Fixture For Orbital Welding Machine”On IJPME, Volume III Issue IV October – December 2015
- [7]. Vaishak bhandary M, Sudeep N S, Naveenakrishna P V “Design and Analysis of Robot Full Welding Fixture for Front Chassis of Wheel Loader” NCAMES ,ISSN: 2231-5381-2016
- [8]. C. A. Kubade , Dr. S.V. Patil , Mr. V. P. Patil “Design and Analysis of Welding Fixture for Automotive Component using FEA” IJARIE-ISSN(O)-2395-4396, Vol-2 Issue-4 2016