

Design & Manufacturing of Gauges & Fixtures for CNG Components of M&M Ltd

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Abstract— We have been given a task to make the design and manufacture gauges and fixtures for the Mahindra & Mahindra new CNG vehicle. Few parts of that vehicle needed three new fixtures and four gauges out of those we already had one of the fixtures but it was unstable during the production. So we are going to construct the gauges and fixtures in such a way that it should be light in weight, very easy to operate and it should be less time consuming and we improvised that one fixture in which they had problems during the production and make them too easy in handling and increased the production rate. The design is the basic step for manufacturing the gauges and fixtures. If the design is proper and safe the manufacturing and production goes smooth.

Keywords— CNG-Compressed Natural Gas, MSA-Measurement System Analysis, CC-Centre To Centre Distance, TRIMOS-Vertical Dimension Measuring Instrument.

I. INTRODUCTION

The Project work presented is based on design and manufacturing of fixtures and gauges for project few components of Mahindra & Mahindra CNG vehicle. The Company selected to accomplish this project is Prince Metal work which is located at Burma shell petrol pump, Sativali road, Vasai (E). The Prince Metal Works Company established in 1971 and It makes the oil sump for engine parts. Now this company have got few components of CNG vehicle of Mahindra & Mahindra. The fixture is mainly used to locate the work piece securely and also supports the work piece by ensuring that all parts using the fixture will maintain conformity and interchangeability with the product. The gauges are devices for confirming its dimensions to start the production of those parts. like "to determine thickness, gap in space, diameter of materials, and to check the center to center distance of the manufactured components.

II. OBJECTIVES

Our objective is to design and manufacture the fixtures and gauges which will be easy in handling, reliable and increase the production rate. The main function of fixture is to improve the economic production by applying smooth operation from part to part and a quick transition. The fixture is used for proper and secure mounting for a work piece, allows support during operation and with increased accuracy, precision, reliability, and interchangeability. It is also used to reduce set-up time, working time, and by smoothing the transition. Fixtures also allow for a higher degree of operator safety by reducing the concentration and use full inspection tool to access the acceptability of part when compared to a predetermine specification essentially gauging whether a component is within a given tolerance and fit for purpose.

III. PROBLEM STATEMENT

1. Mahindra and Mahindra starting a new CNG vehicle so we are supposed to design and manufacture three welding fixtures and four gauges corresponding to the CNG components.
2. From three fixtures we already had one fixture for Bracket Ignition Coil but the fixture was having stability issue during the operation and that was time consuming. So we were supposed to make the new fixture but we been asked to improvise that fixture.

Below is the diagram of four CNG components:

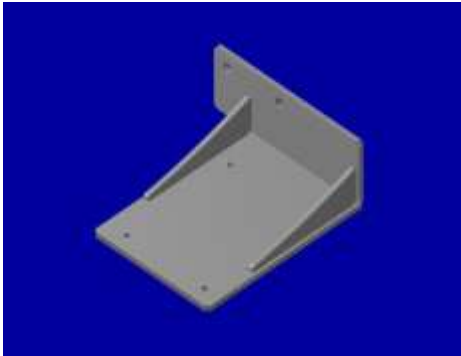


Fig 1. Air Cleaner Mounting Bracket



Fig 2. Bracket Gas Air Mixer Mounting

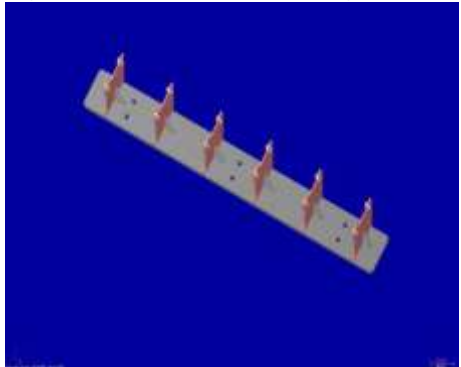


Fig 3. Bracket Ignition Coil

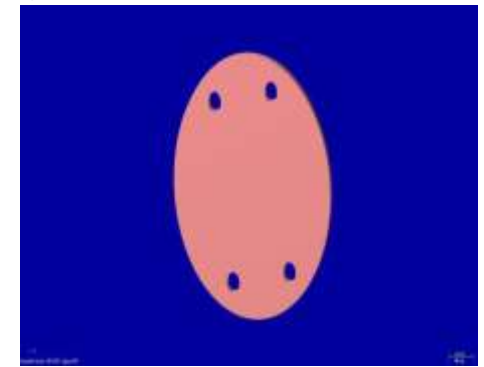
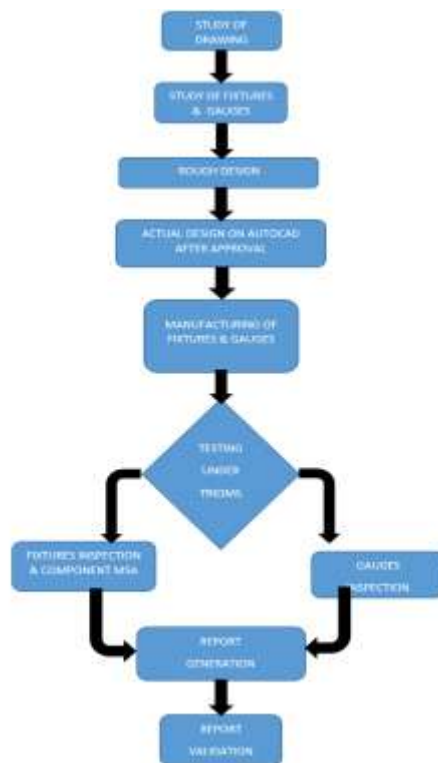


Fig 4. Flip Closer Plate

IV. METHODOLOGY



Fixtures and Gauges can be design and manufacture using nine step methodology in order to obtain

The desired results as follows:

Step 1: We studied the 2D drawing of components.

Step 2: a. We studied the fixtures and gauges.

b. Read the technical paper listed in the report so as to gather information.

Step 3: We drawn the rough sketch as per rough idea of application on paper.

Step 4: a. We did 2D draw on auto cad approval from the design head of company Mr. Sameer Sheikh.

b. 2D drawing was corrected and then it was need final with help of Mr: Vyankatesh Rajkonda.

Step 5: The manufacturing phase will start where in we have to select the material for the fixtures and gauges.

Step 6: After manufacturing those fixtures and gauges will be tested under TRIOMS.

Step 7: Two processes followed parallel

a. Fixtures inspection and components MAS (measurement analysis system)

MSA: It is an experimental and mathematical method of determining how much the variation within the measurement process contributes to overall process variability

b. components inspection.

Step 8: Reports are generated for tests and inspection.

Step 9: Those reports are validated by Mr: Vyankatesh Raikonda (Manager) Production starts

V. CONCLUSION

A In this project, we have been given the task of design and manufacturing few fixtures and gauges required for Mahindra and Mahindra's upcoming new CNG vehicle.

Fixtures should be reliable, easy in handling and increase the production rate etc. and gauges should be less time consuming, less dependent on the skill of labour and economical etc.

After testing of the fixture and gauges the production of components will start.

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