

Design and Development of Exhaust Manifold

“Pathan Ashpak¹”, “Pratik Wackchaure²”, “Sanket Yenare³”,
“Tejas Borahde⁴”

*Department Of Mechanical Engineering
Samarth Group Of College Of Engineering
Corresponding Author :Prof. S.N.shelke*

Date of Submission: 05-05-2023

Date of Acceptance: 15-05-2023

ABSTRACT: Overall engine performance of an engine can be obtained from the proper design of engine exhaust manifold systems. With regard to stringent emission legislation in the automotive sector, there is a need design and develop suitable combustion chambers, inlet, and outlet manifold. Exhaust manifold is one of the important components which affect the engine performance. Flow through an exhaust manifold is time dependent with respect to crank angle position. In the present research work, numerical study on four-cylinder petrol engine with two exhaust manifold running at constant speed of 2800 rpm was studied. Flow through an exhaust manifold is dependent on the time since crank angle positions vary with respect to time. Unsteady state simulation can predict how an intake manifold work under real conditions. The boundary conditions are no longer constant but vary with time.

The main objectives of this experiment is :

- 1) To prepare CAD model using the Autocad software for design and development.
- 2) Find actual and theoretical values of Parts which is develop.
- 3) Increase the efficiency of cylinder of motorbike.
- 4) Compare the both parts before development and After development.
- 5) Increase the gas flow rate change in Design.
- 6) Find the stress in exhaust manifold.

KEYWORDS:CAD, CAM, LISA.

I. INTRODUCTION

The exhaust manifold is a pipe, receives the exhaust gases from the combustion Chamber and leaves it to the atmosphere. Exhaust manifolds are mounted to the cylinder head. Various type of gases are released in environment through the exhaust pipe. The main component of the exhaust are is exhaust Manifold, bend Pipe, baffels, muffler, clips,

Pipe for gas flowing. We developed and design the exhaust manifold pipe for increase the efficiency of vehicle and cylinder head.

II. PROBLEM STATEMENT:

In this Experiment we solve the problem of fluid gas flowing. When the diameter of the pipe is large, the pressure in the bend pipe is low and the incoming gas gets stuck in the pipe or does not flow fast, then the temperature of the cylinder increases and the efficiency of the vehicle decreases. Similarly, the exhaust manifold of mild steel or cast iron lasts for a short time, but in our design we have designed a stainless steel exhaust pipe so that the life of the pipe is increased. Efficiency will increase.

III.LITERATURE REVIEW:

Study of previous exhaust manifold pipe for design and developed new exhaust pipe.

Get knowledge about various Software which is need for project.

Get more knowledge of project with need of automobile market.

Add different type of parts information with help of guide.

Collect information about exhaust manifold pipe and its different material and its functioning.

Get idea of working of project.

IV. METHODOLOGY:

1)What is the aim of project?

2)How many methods are used in project?

3)Which software used in project?

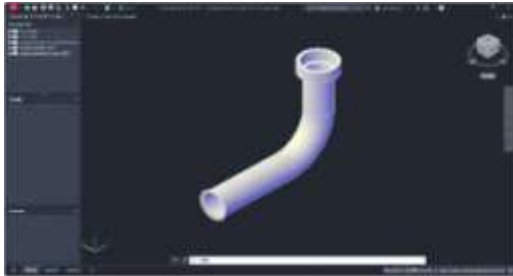
4)Which references and research paper used?

5)What is procedure to achieve fulfilment of Project?

Firstly Gathered information about exhaust manifolds for design new exhaust pipe. In this project we developed and design stainless steel exhaust for more efficiency and longlife operation. Following experiment we done different types of

methods like market research and market problems. We used lisa software for stress calculation.

DESIGN OF EXSTING EXHAUST PIPE:



DESIGN OF NEWELY DESIGN AND DEVELOPED PART:



PARAMETER USED FOR NEW DESIGN OF EXHAUST MANIFOLD:

- 1) X axis height
- 2) Y axis Length
- 3) Diameter of Cylinder cap (inside diameter, Outside diameter)
- 4) thickness of Cap
- 5) diameter of Pipe (internal, outer Diameter)
- 6) thickness of Pipe
- 7) End pipe which is used in new developed pipe.

MATERIAL USED IN EXSITING EXHAUST: MILD STEEL
MATERIAL USED IN NEW EXHAUST: STAINLESS STEEL

DIMENSION OF EXISTING EXHAUST MANIFOLD PIPE ARE FOLLOWING :

- 1) X axis height :160 mm
- 2) Y axis length: 320 mm
- 3)Cap diameter inside:24 mm
- 4)cap diameter outside: 32 mm
- 5) diameter of pipe internal :30mm
Outside diameter :31.5 mm
- 6)thickness of pipe :1.5 mm
- 7) fillet radius :65 mm

DIMENSIONS OF NEW DESIGN AND DEVELOPED EXHAUST PIPE :

- 1) X axis height :160 mm
- 2) Y axis length: 340 mm
- 3)Cap diameter inside:26 mm
- 4)cap diameter outside: 32 mm
- 5) diameter of pipe internal :20mm
Outside diameter :22 mm
- 6)thickness of pipe :2 mm
- 7) fillet radius :70 mm
- 8) End pipe Dimensions are following :
 - a) internal dia:26 mm
 - b) outside dia:24mm
 - c) thickness of End pipe : 2mm
 - d) length of End pipe :80 mm

Existing Exhaust Pipe image (Practical Model)



Original image of Newly design and Developed pipe (Practical Model)



Different Views Of new design and developed part :



Top view



Front view



Side view

Material for exhaust manifold.

REFERENCES:

- 1) Mr. Chandan HS
- 2) Mr. Vishalshrivastav design and analysis
- 3) Prof. S.B. Bawaskar

OUTCOMES/ RESULTS OF EXPERIMENT :

- 1) Due to new design Stress on Pipe is Decreased.
- 2) Mild steel used in Existing Exhaust system. In new system stainless steel pipe are used so weight of exhaust system is decreased.
- 3) Mild steel pipe are less corrosive resistance so life is short and stainless steel pipe is more corrosive resistance so life is more of exhaust system.
- 4) Heat dissipation rate is more new system.
- 5) Decreased cylinder temperature.
- 6) Increase Efficiency of vehicle.
- 7) Flue gases flow fast due to reduce the diameter of pipe because of increased in pressure.
- 8) Less Pressure Drop are Observed.

Advantage of Project:

- a) More corrosive resistance .
- b) Life is more other material -.
- c) Heat remove capacity is more.

Disadvantage:

- a) More costly.
- b) Maintenance is high.

CONCLUSION:

- A) we are developed new exhaust manifold using different parameter.
- B) increase the pipe length at Y axis flow rate is Increased.
- C) In new model development stainless steel Obtained good result to compare Mild steel.
- D) Due to this Experiment we found proper