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Automatic Engine Valve Cleaner

Prof. S. A. Gurav[1], Mr. Sumit Deshmukh[2], Mr. Ketan Dimble[3], Mr. Shubham Patel[4], Mr. Mayur Yadav[5]

Assistant Professor, Mechanical Engineering, NBNSSOE, Pune, India[1]

UG Student, Mechanical Engineering, NBNSSOE, Pune, India[2,3.4,5]

Abstract: *Automobile maintenance is a significant part of the automobile industry, as well as a significant source of revenue for the company. Internal combustion engine maintenance is now widely recognised as a critical component of automotive maintenance, and the valve lapping method described in this thesis is performed during IC engine maintenance. The existing procedures for valve lapping employed in most vehicle maintenance organizations are ineffective and waste a lot of time. The 'Valve Lapping Machine for Internal Combustion Engines' is a machine that is supposed to solve these issues by reducing the amount of time that humans are involved in the process. The thesis consists of the background in designing the machine, methodologies used, results obtained by data analysis in order to optimize the design and design of the valve lapping machine.*

Keywords: Valve Lapping; Engine Valves; Cylinder Head, etc.

I. INTRODUCTION

We developed an Automatic Engine Valve Cleaner for this project. Valve lapping, or the act of making a good fit between engine valves and the matching valve seat area in the IC (internal combustion) engine head (cylinder head), is a work that requires extreme precision. The importance of a good sea is that it prevents the air/fuel mixture (in petrol engines) or air (in diesel engines) from flowing into the combustion chamber, as well as the exhaust gas from the combustion chamber from flowing to the exhaust manifold until the correct time. A good seat also avoids compression leaks. If any of the aforementioned scenarios occur, the engine's efficiency will plummet by large percentages. So as this is a very important task in IC engine maintenance, extra attention is given to this particular task by technicians. This process of valve lapping is typically done using a valve lapping stick or a power tool.

II. LITERATURE SURVEY

"Effect of EGR on the exhaust gas temperature and exhaust opacity in compression ignition engines" by Avinash Kumar Agrawal, Shrawan Kumar Singh, Shailendra Sinha and Mritunjay Kumar Shukla.

NOx generation in diesel engines is a temperature-dependent phenomena that occurs when the combustion chamber temperature surpasses 2000 K. As a result, in order to limit NOx emissions in the exhaust, peak combustion temperatures must be kept under control. Late fuel injection into the combustion chamber is a simple approach to reduce NOx emissions from a diesel engine. Although effective, this technology increases fuel consumption by 10–15 percent, necessitating the employment of more effective NOx reduction strategies such as exhaust gas recirculation (EGR).

Although recirculating a portion of the exhaust gas reduces NOx, it also produces significant particle emissions at high loads, hence there is a trade-off between NOx and smoke emissions. To get maximum benefit from this trade-off, a particulate trap may be used to reduce the number of unburnt particulates in EGR, which in turn reduce the particulate emission also.

"Petrol engine exhaust valve design, analysis and manufacturing processes" by B Seshagiri Rao and D Gopi Chandu.

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The goal of this study is to use theoretical calculations to build an exhaust valve for a four-wheeler petrol engine. The exhaust valve will be subjected to a manufacturing process that includes 2D drawings, a 3D model, and a transient thermal analysis when the valve is open and closed. ANSYS is used for the analysis. When the study state condition is met, the analysis will begin. At 5000 cycles, the study state condition is reached when the valve is closed for 127.651 seconds and opened for 127.659 seconds. The exhaust valve is made out of EN52 steel. We're working on material optimization by analysing both EN52 and EN59 materials. To identify mode, perform a static modal analysis on the exhaust valve. Valve shapes for a specific number Indirect advantage:

"Material Removal Mechanisms in Lapping and Polishing" by C. J. Evans, E. Paul, D. Dornfeld, D.A. Lucca, G. Byrne, M. Tricard, F. Klocke, Dambon, and B. A. Mullany.
Polishing is essential in high-value manufacturing processes like IC manufacture. The underlying mechanisms of material removal, on the other hand, are poorly known. A significant variety of variables influence the technological outputs (e.g., surface finish, sub-surface damage, component shape) and throughput of lapping and polishing procedures. Individual processes are tightly controlled within businesses, yet it appears that there is little capacity to predict process performance in advance. This paper addresses the fundamental mechanics of material removal in lapping and polishing processes as a first step toward enhancing process modelling and identifies critical areas where more research is needed.

III. IMPLEMENTATION

Step 1: We began our project's work with a literature review. We gathered a large number of research papers on this subject. We learned about rod cleaning after reading these papers.
Step 2: - Next, I'll decide the components I'll need for my project.
Step 3: - After agreeing on the components, CATIA software was used to create a 3D model and draught.
Step 4: - The components will be fabricated before being assembled.
Step 5: - After the testing is completed, the results and conclusions will be drawn.

Although the procedure takes the same amount of time for manual and automated machines, the project's main purpose is to reduce human effort by using good, precise machinery. However, if we employ a computer instead of a person, the person will have time to accomplish something else by this time. Additionally, the employee's efforts will be lowered.
This project is beneficial in the case of valve cleaning. The work begins when the motor is turned on. The cam follower setup is driven by a motor. This cam and follower are utilised to make the maneuver. Another motor's output is connected to this spring. The spring's front end is attached to a poppet-shaped component. This component is also utilised for cleaning
In May 1834, Prussian Moritz von Jacobi constructed the first actual rotating electric motor after numerous more or less successful attempts with rather weak rotating and reciprocating machinery. It was able to generate a lot of mechanical output power. In September 1838, Jacobi set a new world record with his motor, which he improved four years later. His second engine was powerful enough to propel a 14-person boat across a vast river. Other developers were also able to construct motors with similar and then superior performance in 1839/40.Most electric motors generate force in the form of rotation by interacting with the magnetic field of the motor and winding currents.
Electric motors can be powered by direct current (DC) sources, such as from batteries, motor vehicles or rectifiers, or by alternating current (AC) sources, such as a power grid, inverters or electrical generators. An electric generator is mechanically identical to an electric motor, but operates in the reverse direction, accepting mechanical energy (such as from flowing water) and converting this mechanical energy into electrical energy.

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A cam and follower mechanism are a shaft-mounted contoured form that moves a lever or follower. Cams convert rotational motion into linear (reciprocating) motion. The follower rises and falls as the cam spins, a phenomenon known as reciprocating motion. A guide restricts the follower's movement to a pre-determined pattern. The force of gravity or a spring keeps the follower in touch with the cam. The stroke is the whole range of movement produced by the cam. The distance between the shaft supporting the cam and the upper and lower points of the rotation circle determines the range of movement of the follower.

Cams are used to regulate valves in engines (where the valve is the follower), sewing machines, children's toys, and a variety of other mechanical applications.

The term "spring" refers to an elastic object that is utilised to store mechanical energy. Spring steel is the most common material used to make springs. There are many different types of springs; in common usage, the term obtain refers to coil springs. Smaller springs can be wound from prehardened stock, while bigger springs are fabricated from annealed steel and then hardened. When a coil spring is slightly compressed or stretched from rest, the force it exerts is roughly proportional to the length change. Any material can be used to make a spring, depending on the design and operating environment. so long as material has the required combination of rigidity and elasticity.

- A bill of material is prepared which is divided into two categories.
- Fabricated components
- Standard purchased components
- The rates of all standard items are taken and added up.
- Cost of raw material purchased taken and added up.

IV. CONCLUSION AND DISCUSSION

The 'Automatic Engine Valve Cleaner' was designed using the "CATIA V5" software. In addition, material selection is completed. Cam and Follower Design has been completed with accurate calculations. The "Autodesk Fusion 360" programme was used to create the 3D model and animation of the Automatic Engine Valve Cleaner. Parts assembly is completed using correct safety and procedures. Automatic Engine Valve Cleaner Model is completed with the utmost care and precision. All of the machine's components should be verified for correct alignment.

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