

Design and Development of Cam and Follower Operated Valve Lapping Machine

Mr. Vikas S. Athawale¹, Mr. Shreyas S. Dabhade², Mr. Dhiraj S. Shirke³

¹⁻³Department of Mechanical Engineering, Sinhgad Institute of Technology, Lonavala

Abstract: Automobile renovation is a major area in the industry of automobile and also a major profit to the business. In present, Internal Combustion engine maintenance can be said as a very critical section in vehicle renovation and the valve lapping process this is subjected in this thesis is done all through IC engine maintenance. The modern-day techniques used in most automobile organizations for valve lapping technique aren't effective and consume a number of running hours. 'Valve lapping Machine for Internal Combustion Engines' is a gadget designed to conquer these problems through minimizing the human involvement in the process. The thesis includes the history in designing the device, methodologies used, results received by using facts analysis so that you can optimize the design and design of the valve lapping system. Lapping is a machining procedure wherein two surfaces are rubbed collectively with an abrasive among them, via hand motion or using a system. This can take two forms. The first form of lapping (traditionally called grinding), involves rubbing a brittle material which include glass towards a floor along with iron or glass itself (also called the "lap" or grinding tool) with an abrasive along with aluminum oxide, jeweler's rouge, optician's rouge, emery, silicon carbide, diamond, etc., between them.

Keywords

Valve Lapping Machine, Cam, Follower's, Stiffness Spring

Introduction

Valve lapping or the manner of creating a seat between engine valves and the corresponding valve seat area within the IC (internal combustion) engine head (cylinder head) is an assignment which need to be achieved very accurately. The significance of obtaining a correct seat is that the air/fuel mixture (in petrol engines) or air (in diesel engines) is prevented from flowing in to the combustion chamber, because the exhaust fuel is avoided from flowing to the exhaust manifold from the combustion chamber till the proper time. And also, a seat prevents compression leaks. The engine will lose its efficiency by large percentages if any of the situations explained above happens. So as this is a very important assignment in IC engine maintenance, extra attention is given to this particular assignment with the aid of technicians. This system of valve lapping is usually finished with the usage of a valve lapping stick or an energy tool. As both of this tool aren't very powerful, those tools may be replaced with the aid of the 'Valve Lapping Machine for Internal Combustion Engines', specially designed for the process of engine valve lapping. The mechanical gadget will perform one of a kind of motion in directions formerly carried out by using hand. Comparatively the valve lapping device is very effective due to the fact the human involvement is very limited in this method. The concept of designing a system for the valve lapping system came to us, while we studied that the conventional approach used for valve cleansing are not green and additionally time consuming. Engine head cleaning and maintenance procedure plays a major role for proper working of engine. The system of valve cleansing takes approximately 1 hour to complete inclusive of testing of the valve seat high-quality using petrol. As the conventional process is performed using a valve lapping stick, it's far very tough and not much efficient. This led us to think how beneficial it could be if there can be a gadget that has a higher overall performance over conventional technique for valve lapping.

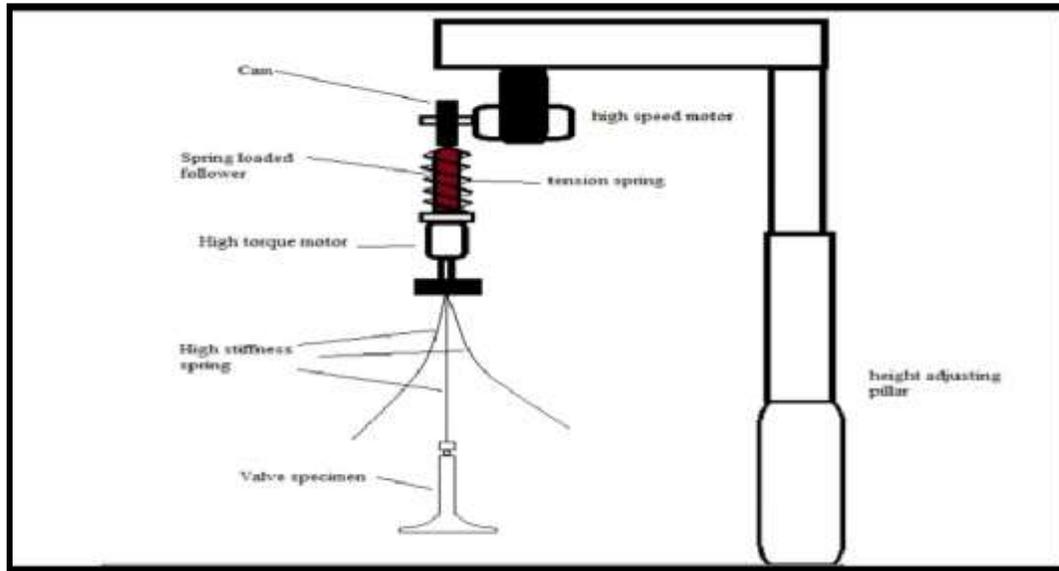


Fig.1 Diagram of Valve Lapping Machine

Literature Review

M.R. Pratheesh Kumar et. Al [1] validated that Lapping is a finishing process in which the material removal takes place due to relative movement among the work material, free abrasive grains, and the lapping plate. This procedure is used in achieving finer surfaces and closer fits, and keeping near tolerances. Although a sizable underlying science base exists on the subject of physics, mechanics, and thermal outcomes. Lapping has been considered as an art, rather than a science. Hence exploring lapping at essential degree will assist to improve its application. This discusses the results of the diverse technique parameters influencing the material removal change and surface finish. This is finished by conducting a chain of experiments with the aid of varying the technique parameters and calculating the material removal rate and floor roughness.

S. M. Fulmali, et. Al [2] explained the Lapping method which is characterized by using its low speed, low strain, and occasional material elimination price. This method is used in reaching finer surfaces and closer fits, correction of imperfections, and keeping near tolerances. During the method of lapping, the mechanisms of surface formation and elimination price are decisively influenced via the movement sort of the man or woman grains within the lapping abrasive. A gate valve is used to begin and forestall the flow of fluid. So, the wedge and seat ring of a valve are in continuous stress of fluid float and due to starting and remaining of valve these elements get wear and they need lapping at some stage in reconditioning. This paper will share the requirement and application of lapping during the reconditioning of valve. This paper will discover the modern-day operating condition of lapping machine in Automobile industry.

Prof. D. Kotkar, et. Al [3] confirmed that the method concerned of reaching proper seat, finer surfaces, nearer fits, correction of imperfection and preserving near tolerances between engine valves and the corresponding valve seat area inside the inner combustion engine cylinder head is a task which ought to be accomplished very accurately. The significance of obtaining a seat is that the air/fuel aggregate in petrol engines or air in diesel engines is avoided from flowing in to the combustion chamber, equal as the exhaust gasoline is prevented from flowing to the exhaust manifold from the combustion chamber until the proper time. And also, a good seat prevents compression leaks. The engine will lose its performance through large probabilities if any of the situations explained above happens. So, as that is a very essential challenge in IC engine maintenance, extra interest is given to this particular mission by means of technicians. This method of valve lapping is typically done with the usage of a valve lapping stick or a power tool. As each of these tools aren't very powerful, these tools can be replaced by the ' Valve Lapping Machine for Internal Combustion Engines', specially designed for the procedure of engine valve lapping. The system employs a completely mechanical and automated device which performs two one-of-a-kind motions in two directions previously executed by using hand when the usage of valve lapping stick and power tool. Comparatively the valve lapping device could be very effective because the human involvement could be very limited in the method. Author concluded that the capability and the performance of the valve lapping machine, its miles had to be developed.

Eraldo Jannone da Silva, et. Al [5] defined that the grinding manner is widely used to produce surfaces of properly dimensional accuracy and finish (Moulik et al., 2001). Besides these features, the grinding method must make sure that the designed mechanical system for the workpiece will no longer be negatively affected. During grinding, because of the chip formation mechanism, a part of the produced energy is converted into warmth and excessive temperatures are generated at the interface among the abrasive grain and the workpiece. These temperatures are the primary supply of damage at the machined floor (Shaw, 1984). It was discovered that thermal stresses generated in the grinding system had been the primary cause of the tensile residual stresses (Chen et al., 2000), which motive a reduction within the carrier life under stress corrosion or fatigue conditions. In many cases, the thermal properties of the workpiece limit the productiveness of superior grinding methods.

Objectives

- The essential goal of this venture is to layout a machine both green and powerful than previously used methods for valve lapping.
- Reduce the labor cost by means of reducing the human involvement in the process.
- The targets that had to be achieved in an effort to achieve the primary goal had been designing the basic version of the system (structure), designing the valve lapping mechanism, assembly of the whole machine by way of designing the elements needed, calculating and designing the cam needed, analyzing statistics and categorizing them with a view to design five valve holding pieces.
- Analyzing facts to attain the specifications of the device, obtaining two dc motor that has particular RPM (revolutions in step with minute) values and identifying what materials need to be used in order for the layout to be long lasting and economical.

Parts Used in Project

- 1) Cam
- 2) Follower
- 3) Low Torque High Speed DC Motor
- 4) High Torque Low Speed DC Motor
- 5) Machine bed
- 6) High stiffness spring
- 7) Height Adjusting Pillar

Actual Presentation of Project



Scope

- The objective of this work is to develop a new Cam and follower operated Valve Lapping Machine
- This concept allows us to obtain our intention as well as better area management.
- The new model considers all the real time conveying gadget and provide answer over their brief coming.
- The new model will get correct efficiency compared to old method.

Conclusion

1. The problem of holding engine valves was solved by designing valve holding pieces.
2. Valve lapping mechanism will be implemented replacing manual labor.
3. Cylinder head supports have eased the moving of cylinder heads horizontally.
4. Valve lapping mechanism will be designed as an assembly of several parts easing any maintenance to the machine.

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