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“A REVIEW ON PRESSURE AND HEAT EFFECT ON I.C. ENGINE PISTON”

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ABSTRACT

The cylinder ring is one of the primary parts of an inner ignition motor. Its primary intentions are to seal the ignition council of the motor, limit the contact against the chamber liner yet additionally move heat from the cylinder to the cooled chamber liner. Another significant property of the cylinder ring is to equitably convey oil along the chamber liner so as to maintain a strategic distance from motor seizure. There are two kinds of cylinder ring: pressure ring and oil ring. Vehicle responding motors ordinarily utilize three rings, two pressure rings and one oil ring. Cylinder ring moves openly inside its furrow. Such developments rely upon the powers and the minutes following up on the cylinder ring framework, for example, the static ring strain from establishment of cylinder ring in the chamber liner, the gas weight powers brought about by chamber weight and pass up gas, the hydrodynamic powers brought about by grease movie, the inactivity powers identified with segment mass and motor speed, and acrimony contact powers brought about by an immediate contact to the chamber dividers. Working states of cylinder rings are exceptionally requesting and it is alluring to comprehend the structure of such part exposed to different burdens. As of late, limited component examination has assumed real job in car industry to structure different segments of vehicle. Consequently, this work intends to plan and dissect the cylinder ring utilizing business FEA apparatus like ANSYS. Auxiliary structures of cylinder rings are not contemplated enough. Thus, this work intends to consider basic structure and investigation of cylinder rings exposed to static burdens.

Keyword: Piston ring, Structural Analysis, Stress, CAD, FEA

I. INTRODUCTION

The cylinder ring is one of the principle segments of an inside burning motor. Its primary objects are to seal the burning assembly of the motor, limit the grating against the chamber liner yet additionally move heat from the cylinder to the cooled chamber liner. Another significant property of the cylinder ring is to uniformly disperse oil along the chamber liner so as to keep away from motor seizure. One chamber in a cutting edge marine two-stroke diesel motor more often than not contains four to five cylinder rings alluded to as the ring pack and for every one of the cylinder rings there is a relating cylinder ring groove at the cylinder in which the cylinder ring is mounted. The top ring of the ring pack ordinarily has a base material of higher evaluation cast iron and now and again the ring is thicker and higher than the other cylinder rings in the ring pack. These plan adjustments are included on the grounds that the top ring is working under higher warm and mechanical burden contrasted with the lower rings. At the point when the motor is killed the single cylinder ring is just influenced by the contact surfaces against the chamber liner and the cylinder ring groove. In any case, when the motor is running the cylinder ring pack is additionally influenced by gas weights and temperature coming about because of pressure and burning. The chamber weight follows up on the upper piece of the top cylinder

ring and a small amount of the chamber weight acts beneath the top cylinder ring. Genuine working conditions can be admired as appeared in Fig. 1

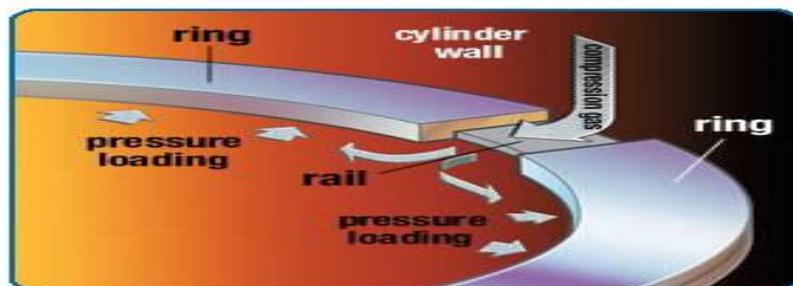


Fig.1 Forces following up on Piston Ring

II. LITERATURE REVIEW

A. Fundamental elements of cylinder rings

1) Sealing of burning gases

The fundamental undertaking of pressure rings is to forestall the section of ignition gas among cylinder and chamber divider into the crankcase as appeared in Fig.2. For most of motors, this goal is accomplished by two pressure rings which together structure a gas maze. For configuration reasons, the snugness of cylinder ring fixing framework in burning motors is underneath 100%; subsequently a limited quantity of pass up gases will consistently go by the cylinder rings in to the crankcase. This is be that as it may, an ordinary state which can't be totally maintained a strategic distance from because of the structure. It is basic however, to avert any intemperate exchange of hot ignition gases past the cylinder and chamber divider. Generally this would prompt power misfortune, an expansion of warmth in the segments just as lost greasing up impacts. The administration life and the capacity of the motor would subsequently be disabled.



Fig. 2: Sealing of ignition gases

2) Scraping and appropriating oil

Beside fixing the zone between the crankcase and ignition chamber, the cylinder rings are likewise used to control the oil film. The oil is consistently disseminated on to the chamber divider by the rings. Most abundance oil is evacuated by oil control (third ring), despite the fact that the joined scrubber pressure rings (second ring) expels the oil. Fig. 3 shows scrubber (wiper or second ring) ring just as oil ring (third ring).

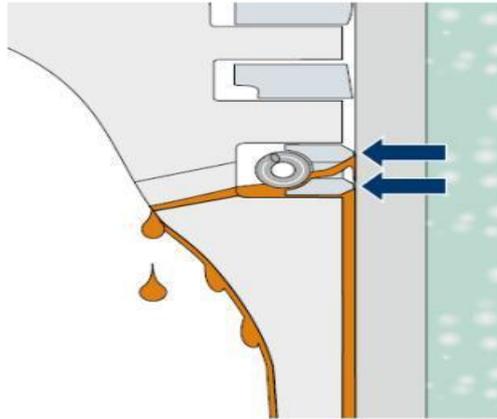


Fig. 3: Scraper and Oil Ring

3) Heat dissipation

Temperature the board for the cylinder is another fundamental errand of the cylinder rings. The real bit of the head consumed by the cylinder during the burning procedure is dispersed by the cylinder rings to the chamber surface. The pressure rings, specifically, are altogether associated with warmth scattering. half of the ignition warmth consumed by the cylinder is as of now dispersed to the chamber divider by the upper pressure ring (contingent upon the motor kind). Without this ceaseless warmth dispersal by the rings, a cylinder seizure in the chamber bore would happen inside a couple of minutes or the cylinder even dissolve. From this point of view, it is clear the cylinder rings should consistently have legitimate contact to the chamber divider. At whatever point out-of-roundness is caused in the chamber bore or if the cylinder rings are stuck in the ring groove (carbon fouling, soil, twisting), it may be matter of time until the cylinder experiences overheating because of an absence of warmth dispersal.

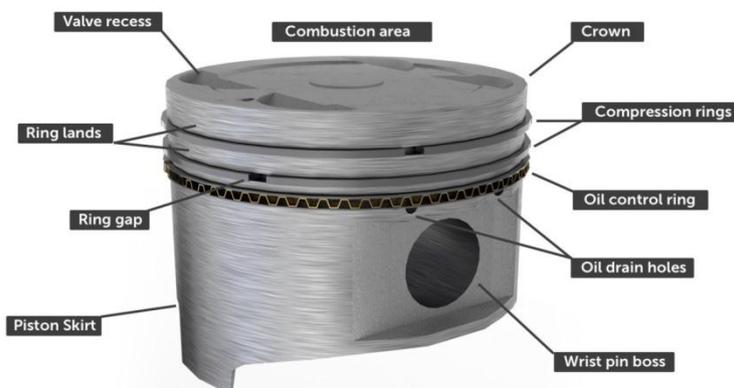


Fig. 4: Heat dissemination because of cylinder rings

B. Various investigative models present in Piston rings 1) Analytical Models

In view of writing audit it is seen that generally cylinder ring studies are fixated on two material science tribology and CFD. Be that as it may, there are not many examinations which incorporates auxiliary structure of cylinder rings. Following segment audits writing in the territory of oil and stream.

2) Lubrication Models

Sellers and Hardy [6] found that hydrodynamic grease (HL) won all through the greater part of the motor cycle by erosion estimations. They previously proposed the proof of hydrodynamic oil between a cylinder ring and a chamber liner in 1936. Castleman [7] connected the idea of hydrodynamic oil to cylinder ring examination. Eilon and Saunders [8] expected a symmetric explanatory profile, and determined the thickness of the oil film and the rubbing power of the ring. Furuhashi [9] considered a ring profile comprising of a focal level area and two round circular segments at the two finishes. The weight following up on the cylinder ring the outspread way is thought to be made out of the weight at the internal side of the ring and the cylinder ring versatile weight.

3) Flow Models

The gas stream between the freedom is thought to be a laminar stream because of the little Reynolds number (<1000) [10]. One-measurement Reynolds condition was utilized. The numerical estimate of this stream is like the hydrodynamics oil as recently portrayed.

4) Structural Models

Numerous investigations depend on analyses, tribology and CFD based as referenced in before segment. There is small comprehension of auxiliary methodology in the plan of cylinder rings. This work means to think about auxiliary structure of cylinder rings exposed to static loads as appeared in Fig 1 utilizing two techniques: logical strategies and limited component strategy.

C. Findings of the writing survey

As of now, following systems are utilized in cylinder ring structures:

1) Experimental

Different analyses have performed by scientists to structure and test different stacking states of cylinder rings.

2) Analytical

Different explanatory details are accessible for plan of cylinder rings dependent on material science of cylinder ring considered. Working states of cylinder ring are extremely requesting and requires comprehension of multi-material science. Regularly following three material science are associated with the plan of cylinder rings:

- a) Structural: Strength contemplations in cylinder rings.
- b) Thermal: Considerations of Thermal extension
- c) Fluid: Tribological conditions for better execution of the motor.

Proper material science (single or coupled) is considered for

plan of cylinder rings dependent on the goal.

3) Numerical

Different FEA based business devices are broadly utilized, for example, ANSYS, Abaqus, Nastran, and so on to approve or enhance the plans of different items. Utilization of FEA devices has diminished item advancement time. This is generally new to the structure and examination of cylinder rings. In proposed work one of the FEA instrument will be utilized to do plan approvals of one of the cylinder rings.

III. OBJECTIVE OF RESEARCH WORK

Cylinder rings have been being used for whatever length of time that burning motors themselves. In spite of this, numbness or lacking learning of cylinder rings is still every now and again apparent today. No other part is so basic when power misfortune and oil utilization are in question. With no other part in the motor is the gap among desires and used capital more prominent than when supplanting cylinder rings. Very frequently, trust in cylinder rings endures because of the overstated requests made on them. As showed in before, auxiliary plans of cylinder rings are not contemplated enough. Thus, the extent of this undertaking includes following obAn after destinations:

- A. Selecting suitable bike cylinder rings for completing this investigation.
- B. Analytical (auxiliary) structure of cylinder rings utilizing investigative definitions accessible in writing.
- C. Finite Element Analysis of cylinder rings exposed to different burdens following up on it.
- D. Compare expository and FE results.

IV. CONCLUSION

- Piston rings of responding motors have a few capacities separated from fixing the gas weight which influence execution of motor.
- From literature it gives the idea that cylinder ring can be planned utilizing exploratory, systematic and numerical strategies.
- Structural structure of cylinder rings utilizing FEA isn't contemplated adequately. Consequently, plan approval can be carried out utilizing business FEA instruments, for example, ANSYS.

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