LUBRICATION OIL SYSTEM DESIGN FOR A NEW 4-STROKES SINGLE-CYLINDER ENGINE CYLINDER HEAD

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SUPERVISOR'S DECLARATION

I hereby declare that I have checked this project and in my opinion this project is satisfactory in terms of scope and quality for the award of the degree of Bachelor of Mechanical Engineering with Automotive Engineering.

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STUDENT'S DECLARATION

I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged. The thesis has not been accepted for any degree and is not concurrently submitted for award of other degree.

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ABSTRACT

Reliability and performance of modern engines are directly dependent on the effectiveness of lubricating systems. To be effective, an engine lubricating system must successfully perform the functions of minimizing friction between the bearing surfaces of moving parts, dissipating heat, and keeping the engine parts clean by removing carbon and other foreign matter. In almost all modern internal-combustion engines, the system that provides the lube for these functions is the forced-lubrication system. Although there are many variations in lubricating systems for internal-combustion engines, the components and method of operation are basically the same. Steady state thermal analysis is carried out for the thermal fluid flow in the engine. Solidwork software is used for modeling the design and steady state analysis. The upper piston with variation of groove has been design for this simulation. For each piston, four different radius of groove design at the upper piston are use to analyze the thermal effect to the cylinder head and engine oil temperature. For conclusion, the quality of engine lubrication depends upon how much oil is supplied and how the lubricant is fed under thermal load of the components. This state of lubrication is closely related to the safe operation of an engine and its lifetime. Therefore, a practically optimized analytical method has been required by engine designers.

ABSTRAK

Prestasi enjin moden secara langsung bergantung pada keberkesanan sistem pelinciran enjin. Untuk lebih efektif, sistem pelincir enjin seharusnya dapat memenuhi kriteria dan fungsi minyak enjin seperti mengurangkan geseran antara permukaan bersentuhan, bahagian yang bergerak,menyerap haba, dan menjaga bahagian-bahagian enjin supaya bersih dengan membuang karbon dan benda asing yang lain. Hampir semua enjin pembakaran dalaman pada masa kini menggunakan sistem jenis pelinciran paksaan. Walaupun terdapat banyak variasi dalam sistem pelincir untuk enjin pembakaran dalaman, komponen dan kaedah operasi pada dasarnya adalah sama untuk semua rekabentuk. Analisis terma dilakukan untuk menkaji aliran terma bendalir didalam enjin. Perisian Solidwork digunakan untuk merekabentuk model dan juga digunakan untuk menganalisis kesan terma ke atas enjin. Untuk simulasi ini,piston telah diubahsuai dengan menggunakan variasi pada diameter alur. Untuk setiap piston yang direkabentuk, empat diameter yang berbeza alur digunakan untuk menganalisis kesan terma pada silinder dan suhu minyak enjin. Sebagai kesimpulan, kualiti pelinciran enjin bergantung pada seberapa banyak minyak yang dibekalkan dan bagaimana pelincir bertindak di bawah kesan terma terhadap komponen yang berkaitan. Kegunaan pelinciran ini berkait rapat untuk memastikan enjin dapat operasi dengan selamat dan meningkatkan jangka hayatnya. Oleh kerana itu, kaedah analisis digunakan adalah praktikal yang disyorkan oleh pereka bentuk enjin.

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3D	Three dimension
BDC	Bottom dead center
CAD	Computational aided design
CFD	Computational fluid dynamics
LL	Lower level
TDC	Top dead center
UL	Upper level