A Study of Methods of Engine Knock Detection and the Engine Operating Parameters that Affect Engine Knock

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ABSTRACT

Knock control systems are widly used in cars to enhance engine performance and numerous methods of determining engine knock are developed.It is important to know how closely these methods are correlated.In the present thesis,evaluation and correlation of these methods are performed. The results show : the integration of squared pressure oscillation has the highest sensitivity among the methods using cylinder pressure for knock detection.Among the methods using accelerometer for knock detection,the integration of rectified vibration signal is the one best correlated with the method using cylinder pressure for knock detection.So when an accelerometer is installed on the engine block as a knock sensor,the integration of rectified vibration singal will give the best results.

Keywords : 0

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REFERENCES

[1]Amann,C.A.:"Cylinder-pressure measurement and Its use in engine research",SAE Paper 852067,1985.

[2]Armstrong,D.L,and Stirrat,G.F.:"Ford's 1982 3.8L V6 Engine",SAE Paper 820112,1982.

[3]李書橋 林志堅 編著 : 汽車感測器原理 臺北市 全友書局 民國七十七年 [4]U.Spicher,L.Spiegel,and B.Reggelin,"Investigstion Into the Applicability of an Optical Filber Sensor for knock detection and knock control system",SAE Paper 922370,1992.

[5]Norihiko Nakamura,Eishi Ohno,Masanobu Kanamaru,and Tomoyuki Funayama,"detection ofhigher ferquency vibration to improve knock controllability",SAE Paper 871912,1987.

[6]M.D.Checkel and J.D.Dale,"Computerized knock detection from engine pressure records",SAE Paper 860028,1996.

[7]Michalis Syrimis,kei Shigahara,Dennis N.Assanis,"Correlation between knock intensity and heat transfer under light and heavy knocking condition in spark ignition engine",SAE Paper 960495,1996.

[8]Karl P.Schmillen,Manfred Rechs,"Different Methods of knock detection and knock control",SAE Paper 910858,1991.

[9]M.D.Checkel and J.D.Dale,"Comparion between pressure trace knock mesurements and a commercial accelerometer knock sensor in a current production engine",ISATE Paper 88097,1988.

[10]L.W.Evers,"Spark plug pressure transducers for measuring indicated work ",SAE Paper No. 780148,SAE congress,Detroit,1978.

[11]Ricardo,"Recent research work on the internal-combustion engine",Trans.SAE 17,Pt.1,1(1992).(Opinions of a pioneer in intternal-combustion engine research.) [12]Tizeard and Pye,"Ignition of gases by sudden comperession,"Phil.Mag.44,79(1922).(Work with early rapid-compression machine) [13]Wheeler,R.W. : Abnormal combustion efffects on economy,"in J.C.Hilliard and G.S.Springer(eds.),fuel economy in road vehiceles powered by spark-igniton engines,chap.6,pp.225-276,Plenum Press,1984.

[14]Nakagawa,Y.,Takagi,Y.,Itoh,T.,and Iilima,T.,"Laser Shadowgeaphic Analysis of knocking in S.I Engine",SAE Paper 845001,1984.
[15]Nakajima,Y.,Nagai,T.,Iijima,T.,Yokayama,J.,and Nakamura,K.,"Analysis of combustion patterns effective in improving Anti-knock performance of a spark ignition engine",JSAE Review March 1984.
[16]Konig,G.,and Sheppard,C.G.w,"End Gas Autoignition and knock in a spark ibnition engine",SAE Paper 902135,1990.
[17]Ethyl corporation :"Engine combustion noises,"Ethyl technical note PCDTN-MS 117768 Rev.774.
[18]Strphen RUSS,"Areview of the effect of engine operating conditions on borderline knock",SAE Paper 960497,1996.
[19]Douaud,A.,and Eyzat,P.:"DIGITAP-An On-Line Acquisition and Processing System for Instantaneous engine Date-Applications,"SAE Paper 770218,1988.
[20]Thomson,W.T.,"Theory of vibration with applications",Prentice-hall international,Inc.,London,1988