

Final Project

**DETECTION AND ANALYSIS SIGNAL
ENERGY OF PISTON RING DAMAGES ON
FOUR STROKES ENGINE**



Prepared by :

Dondi Kurniawan
NIM : D 200 102 011

**MECHANICAL ENGINEERING PROGRAM STUDY
ENGINEERING FACULTY
MUHAMMADIYAH UNIVERSITY OF SURAKARTA
NOVEMBER 2014**

DECLARATION OF RESEARCH AUTHENTICITY

I assert verily that the research entitles:

DETECSION AND ANALYSIS SIGNAL ENERGY OF PISTON RING DAMAGES
ON FOUR-STROKES ENGINE.

That made to fulfill some of requirement to get Bachelor Degree of Engineering in
Automotive Department of Muhammadiyah University Surakarta, as far as I know
it is not a plagiarism of research that has been published, except the information
source which used to solve the problem.

Surakarta, November 2014

Researcher,



Dondi Kurniawan

APPROVAL

The Final Project entitles "Detection and Analysis Signal Energy of Piston Ring Damages on Four-Stroke Engine" has been approved by Supervisors and authorized by Secretary of International Program as partial fulfillment of the requirements for getting the Bachelor Degree of Engineering in Automotive Department of Muhammadiyah University Surakarta.

Written by:

Name : **Dondi Kurniawan**

NIM : **D 200 102 011**

Has approved and legalized on:

Day : *Monday*

Date : *17-11-2024*

Supervisor I



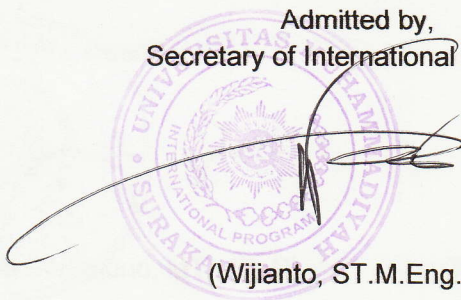
(Ir. Pramuko, MT)

Supervisor II



(Wijianto, ST.M.Eng.Sc)

Admitted by,
Secretary of International Program



(Wijianto, ST.M.Eng.Sc)

VALIDATION

The Final Project entitles "Detection and Analysis Signal Energy of Piston Ring Damages on Four-Stroke Engine" has been approved by Supervisors and authorized by Secretary of International Program as partial fulfillment of the requirements for getting the Bachelor Degree of Engineering in Automotive Department of Muhammadiyah University Surakarta.

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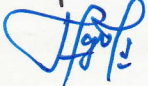
Day/Date : **Monday, 17 November 2014**

Team of Examiners :


Chair Person : Ir. Pramuko, MT


Member 1 : Wijianto, ST, M.Eng.Sc

Member 2 : Dr. Agus Dwi Anggono

()
()
()

Admitted by

Dean,

(Ir. Sri Sunarjono, MT., Ph.D)

Head of Department,

(Dr. Tri Widodo Besar Riyadi)

**DETECTION AND ANALYSIS SIGNAL ENERGY OF PISTON RING
DAMAGES ON FOUR STROKES ENGINE**

Dondi Kurniawan

Automotive/Motorcycle Engineering Department

MUhammadiyah University of Surakarta

Jl. Ahmad Yani Tromol Pos 1 Pabelan Kartasura 57102

Email: dondikurniawan@gmail.com

ABSTRACT

The purpose of this study is to develop the piston ring damage detection technique using vibration analysis. Vibration analysis was performed by measuring vibration in four stroke engine which were worn and scratched on its piston ring, then compare it with the vibrations generated by engine which had a good conditions.

Tests carried out on engine rotations of 750, 1500, and 2250 rpm, where the sensor were placed on the cylinder head and cylinder block. Vibration measurement produced a signal in the time domain, which then be analysed their signal energy by manual calculation which based on trapezoidal rule.

Result of the research showed that the vibration signal energy decrease in all of the strokes of the defect piston ring. It was caused by the pressure of the defect piston ring smaller than the good piston ring. The decrease of vibration signal energy in suction and compression stroke were greater than the power and exhaust stroke. Indication of piston ring defect could be shown from the decrease in the vibration signal energy in all of the strokes.

Key Word: Vibration Signal, Signal Energy, Piston Ring Condition, Pressure down, Amplitude

MOTTO

Imaging my word, I read the meaning, I tied in paragraph, I frame in chapter a number of five, and it become a masterpiece, I received a bachelor's degree, parents, fiancée and future in-laws were happy.

I came, guidance, examination, revision, and I won.

I am thankful to all those who said NO to me, It is because of them I did it myself.

(Albert Einstein)

It is very easy to defeat someone, but it is very hard to win someone. (Dr. Abdul Kalam)

Real friend is one who grabbed your hand and touches your heart. (Heather Pryor)

We pray when troubles and in need of something, we should also pray in great excitement and abundant sustenance. (Khalil Gibran)

The lack of confidence that make people afraid to face the challenges, and I believe in myself. (Muhammad Ali)

Work like do not need money. Love like never hurt. Dance like no one watching. (Mark Twain)

DEDICATION

This Research Paper is dedicated to

Allah SWT,

Thanks for the best everything You have given for me and thanks for your love that make me never give up to do the best. I believe that you will always give me the best for everything.

My Beloved Mom and Dad,

Drs. Mahwan Jayadi and Mariama, Spd

Thanks for your pray, love, support, and affection. You always give me happiness but I often made you disappointed. I am sorry and I promise to give you the best in the future.

All of my classmates (Automotive 2010),

Thanks to all of you for giving me valuable experience for along 4 years.

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Assalamu'alaikum Warohmatullahi Wabarokatuh

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10. The Good Friends of Mine in Live and Love, Rio Firyandha, Fenny Alvionita, Ayu Budi Permata, Azhari Kahfi, Pagella Pasca and Prawira Wardany who have given me the way to treat and survive from the full of fake people.
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12. My Classmates Automotive Engineering 2010, thanks for you laugh and funny moment for along these 4 years.
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The writer realize that this research is far from being perfect, so the writer sincerely welcome any constructive comment, critics, and suggestion from anyone.

Wassalamu'alaikum Warohmatullahi Wabarokatuh

Surakarta, November 2014

Writer



Dondi Kurniawan

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