FINAL PROJECT

ANNEALING EFFECT ON THE MICROSTRUCTURE TOWARD TENSILE STRENGTH AND FATIGUE STRENGTH OF MOTORCYCLE WHEEL SHAFT OF LOW CARBON STEEL

Submitted as a Partial Fulfillment of the Requirements for Getting the Bachelor Degree of Engineering in Automotive Department

Arranged by:
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IN AUTOMOTIVE/MOTORCYCLE ENGINEERING
MUHAMMADIYAH UNIVERSITY OF SURAKARTA
2013

DECLARATION OF RESEARCH AUTHENTICITY

I assert verily that the research entitles:

ANNEALING EFFECT ON THE MICROSTRUCTURE TOWARD TENSILE STRENGTH AND FATIGUE STRENGTH OF MOTORCYCLE WHEEL SHAFT OF LOW CARBON STEEL

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

Surakarta, July 2013

Researcher,

Achmad Fauzan

APPROVAL

The Final Project entitles "**Annealing Effect on The Microstructure Toward Tensile Strength and Fatigue Strength of Motorcycle Wheel Shaft of Low Carbon Steel** " 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 of Surakarta.

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Date : 2 August 2013

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(Wijianto, ST.M.Eng.Sc.)

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VALIDATION

The Final Project entitles **"Annealing Effect on The Microstructure Toward Tensile Strength and Fatigue Strength of Motorcycle Wheel Shaft of Low Carbon Steel"** has been defended in front of examiners team and approved as a partial fulfillment of the requirements for getting the Bachelor Degree of Engineering in Automotive Department of Muhammadiyah University of Surakarta.

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Member 2 : **Dr. Supriyono** ( )

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Dean,	Head of Department,
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MOTTO

[5] For indeed, with hardship [will] be ease, [6] Indeed, with hardship [will be] ease (Al-Insyirah: 5-6)

[7] Then shall anyone who has done an atom's weight of good, see it! [8] And anyone who has done an atom's weight of evil, shall see it.

(Al-Zalzalah: 7-8)

[7]“And remember! Your Lord caused to be declared (publicly): “if ye are grateful, I will add more (favors) unto you; but if ye show ingratitude, truly My punishment is terrible indeed.” (Q.S. Ibrahim: 7)

Allah will not change the condition of a people until they change what is in themselves. (Q.S. Ar-Ra’d : 11)

The Prophet (sallallahu alaihi wasallam) said "A single day under a just ruler (Khaleefah) is better than 60 years of ibadah"

(HR. Bayhaqi/Tabarani)

People are always learning will be very respected and strength not based on knowledge wills collapse.

(AL-Ghozali)

Anyone who pursue the path to knowledge therein, Allah
paves the way for him to heaven (Narrated by Muslim)

We only have one future, and it will be made of our dreams, if we have the courage to challenge convention (Soichiro Honda)

Enjoying your work is essential. If your work becomes an expression of your own ideas, you will surely enjoy it (Soichiro Honda)

DEDICATION

This Research paper is dedicated to:

Allah SWT,

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

My beloved Mom and Dad,

Thanks for your prayer, love, support and affection.

You always give me happiness but often I made you disappointed.

I am sorry and I promise to give you the best in the future.

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Thanks for your supports and love me.

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The Final Project entitles "Annealing Effect on The Microstructure Toward Tensile Strength and Fatigue Strength of Motorcycle Wheel Shaft of Low Carbon Steel" can be done because of chelping and supporting from other people. Therefore, writer sincerely would like to say thanks and appreciation to:

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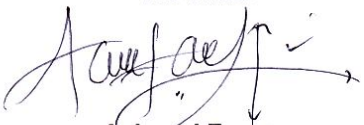
15. Those who cannot be mentioned one by one, writer wants to say his thank and appreciation to all of them.

The writer realizes that this research paper is far from being perfect, so the writer sincerely welcomes any constructive comment, criticism, and suggestion from anyone.

Wassalamu'alaikum Warohmatullahi Wabarokatuh

Surakarta, July 2013

The Writer



Achmad Fauzan

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ANNEALING EFFECT ON THE MICROSTRUCTURE TOWARD TENSILE STRENGTH AND FATIGUE STRENGTH OF MOTORCYCLE WHEEL SHAFT OF LOW CARBON STEEL

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ABSTRACT

The Objective of this research is to determine the effect of annealing on physical and mechanical properties of the motorcycle wheel shaft. The tests conducted are testing the chemical composition, hardness, tensile strength, fatigue strength, and microstructure.

The methods to conduct in this study apart from literature, the authors also conducted the test. The material to be studied is a low carbon steel, specimens will be used are without heat treatment and with heat treatment. The annealing processes was conducted by heating the material up to 900^0C with holding time for 60 minutes and then cooling it slowly in the furnace. Physical properties of the specimens tested by testing the chemical composition and microstructure observation, while the mechanical properties determined by hardness testing, tensile testing, and fatigue testing.

The results showed that the chemical composition of the material shaft wheel motorcycle included in the low-carbon steel (C < 0.2 %). Microstructure observations, the specimens before annealing obtained ferrite and pearlite phase with a small grain size. Whereas, after annealing has a bigger grain size and dominated by ferrite. Hardness test results before annealing has the highest value 205.69 Kg/mm^{2}but after the annealing has the highest value 93.81 Kg/mm^2. Tensile strength test results before annealing has the highest value 56.18 Kg/mm^2 but after the annealing have the highest value 39.76 Kg/mm^2. And for fatigue strength testing maximum load that can be imposed before annealing 33.30 Kg/mm^2 whereas after annealing the maximum load that can be imposed 17.93 Kg/mm^2.

Keywords: annealing, tensile strength, fatigue strength, low carbon steel.