



**METALLOGRAPHIC ANALYSIS ON LOW TEMPERATURE GAS  
NITRIDING PROCESS OF AISI 316 STAINLESS STEEL**

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A thesis submitted in partial fulfillment of the requirements for the award of  
Bachelor of Mechanical Engineering (Manufacturing) (Hons)

**Faculty of Mechanical Engineering  
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**MAY 2010**

“I declared that this thesis is the result of my own work except the ideas and summaries which I have clarified their sources. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any degree.”

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## ACKNOWLEDGEMENT

In the name of God, Allah S.W.T, Most Merciful, Most Beneficent, Most Gracious. All Praises and grace to Allah, the Lord of universe and peace be upon Allah's messenger, Muhammad S.A.W, the last prophet and the righteous followers. I am very grateful to Allah for all the strengths, blessing, and ability to complete this thesis. All perfect things belong to Allah. May this blessing also belong to Muhammad S.A.W and members of his family and other companions.

I would like to extend my sincere gratitude and appreciation to my project advisor, En. Mohd Shahrizan Adenan for her generous guidance, continue support, help, and advice in finishing my proposal for final year project 1. His supporting make me ease to complete my proposal.

Beside, I also would like to thank all the Mechanical Engineering Department's technicians, for Fabrication or workshop Technician; En. Fazly Zaimie Yaakob, Heat Treatment Lab Technician; En. Ahmad Hairi Simon, Material Science Lab Technician; En. Mohd Rahimi Abd Rahman and En. Hayub Ta, for helping me more understand in using a tool and lab machine and make this proposal accomplished successful.

Thank you.

## ABSTARCT

Stainless steel is a commonly used metal in industrial factory. Stainless steel is the most common form of steel provides material properties that are acceptable for many applications. This thesis describes a study on the effect of thermochemical process on microstructure of austenitic stainless steel by low temperature nitriding process. For this project, there were 15 of specimens prepared by fabricating the stainless steel to square shape (40mm×40mm×4mm) prior to nitriding process. For the heat treatment process, specimen is exposed to nitrogen gas at low temperatures 400°C to 500°C for 1 hour to 7 hours holding time using fluidized bed furnace. Treated samples were characterized by means of morphological analysis, in order to investigate the influence of temperature and treatment time on the microstructure, by using scanning electron microscopy and image analyzer microscope. Moreover, the results were compared with those observed for untreated samples. The modified surface layer of the nitrided samples consists mainly of the S-phase and according to metallographic technique analysis; it seems to be modification of the austenite matrix. All nitride samples show a strange surface morphology. X-ray diffraction analysis shows that for the samples nitrided, besides the S phase, small chromium nitride precipitates are present at the surface, while using higher treatment temperatures both chromium (CrN) and iron ( $\gamma'$ -Fe<sub>4</sub>N) nitrides precipitate on surface of samples.

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