THIN WALL DUCTILE IRON (TWDI) AND AUSTEMPERED DUCTILE IRON (TWADI) CASTINGS

By

Noha Saeed Abdel-Haleem El-Banna

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
Metallurgical Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Key Words:
Thin Wall Castings, Ductile Iron, Austempered Ductile Iron, Cooling Rate, Mechanical Properties.

Summary:
There are 3 major challenges that face automotive manufacturers: emissions control, cost manufacture reduction and fuel economy improvement. When thin wall ductile iron casting was introduced to be used for automotive industry, there were many problems experienced in trying to produce it. This research aims at investigating metallurgical and technological parameters involved in the production of thin wall and light weight iron castings (3mm) for automotive applications. Two grades of iron will be studied i.e. ductile iron (DI) and austemeperd ductile iron (ADI) castings. Parameters to be studied will include: the chemical composition of the iron alloys, the melting and the molten treatment, the solidification rate and the molding techniques (green sand, green sand + 10% insulation material and investment castings), and the austempering treatment for ADI. This study will cover the effect of the rate of cooling on the matrix structure and the mechanical properties of DI & ADI castings as well as the influence of the austempering temperature on the mechanical properties of ADI.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Dedication

To my Family and my friends who supported me along the way.

Acknowledgments

I would like to express my deep regards and sincere gratitude to Prof. Dr. Abdel-Hamid A. Hussein, Faculty of Engineering, Cairo University for his care, kind supervision, encouragement, constant efforts, and valuable stimulating guidance and fruitful discussion throughout this study.

I offer my profuse thanks with humble reverence to Prof. Adel Nofal, Foundry Technology Laboratory, Central Metallurgical Research and Development Institute (CMRDI), for his invaluable guidance and support. He was a beacon light, whose constant efforts and encouragement proved to be a parallel stimulus in completing this research successfully.

I would like to thank Assistant Dr. Mahmoud Talaat, Faculty of Engineering, Cairo University for his supervision.

I am grateful to my supervisor Dr. Mohamed Morad for his support and co-operation in the hours of need and for his expert.

This Work is fully supported by the Science and Technology Department Fund (STDF) under the frame work of the Korean project titled “Thin-Wall Iron Castings for Automotive Applications”.

Last but not least, special thanks are due to the staff of Foundry Technology Laboratory, CMRDI and particularly metallographic, melting, workshop staff for their sincere help.

Finally, I would like to acknowledge with gratitude, the support and love of my family – my parents and my lovely sister and brother. They all kept me going and my work wouldn’t have been possible without them.

Table of Contents

Austempered Ductile Iron (ADI) Castings

List of Tables

List of Figures