بسم الله الرحمن الرحيم

شبكة المعلومـــــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

﴿ قـــســـم ﴾

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %

بعض الوثائق الأصلية تالفة

بالرسالة صفحات

لم ترد بالأصـــل

THE EFFECT OF RESIDUAL STRESSES AND HEAT TREATMENT ON SOME PHYSICAL PROPERTIES AND MICROSTRUCTURE OF CERTAIN FE-ALLOYS.

Thesis Submitted
in Partial Fulfillment for the Degree of
Master in Materials Science
(Materials Technology)

By

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1999.

To my Mother.....

Acknowledgment

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SUMMARY

Summary

The purpose of this work is to study the effect of cold work and heat treatment on the microstructure and mechanical properties of low and medium C-steel.

To carry out this study, two different approaches were used, The first approach is based on an experimental work and the second one is based on a computer simulation, which was developed for this purpose.

Low and medium C-steel drawn wire samples of different cold work were subjected to two different types of heat treatment; HT1 is of slow cooling rate and HT2 of rapid cooling rate. Both the as-received and heat treated samples were subjected to microstructural analysis and mechanical tests. In the computer simulation UTS and VHN were evaluated at different %cold work and different heat treatment regimes for both alloys.

The main findings obtained from the experimental work were:

As residual stresses increase, as a result of increasing %deformation ,average grain diameter (D) decreases while the No. of grains per square inch (No./in ^{2}) and grain index (G) increase in the cross–sectional direction. The reverse is true in the longitudinal drawing direction.

Increasing residual stresses also leads to an increase in both ultimate tensile strength (UTS) and hardness (VHN), with a subsequent decrease in ductility (%δ) for both alloys.

Application of slow cooling rate during the heat treatment HT1, decreases

residual stresses to minimum values, hence, increases D and %δ to maximum values with subsequent decrease in the No./in^2, G, UTS and VHN to minimum values

Rapid cooling rate (HT2), on the other hand, decreases residual stresses to intermediate values compared to as-received values and those of HT1; hence all the previously mentioned properties were of intermediate values between the as-received values and those of HT1.

An attempt was made to correlate UTS and VHN data obtained from experimental work.

Applying computer simulation, the same general behavior was obtained concerning UTS and VHN for both alloys.

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CHAPTER I

INTRODUCTION