شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأفلام قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

To be Kept away from Dust in Dry Cool place of 15-25- c and relative humidity 20-40%

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

بعض الوثائق الاصلية تالفة

بالرسالة صفحات
لم ترد بالاصل

622

Suez Canal University
Faculty of Petroleum and Mining Engineering
Metallurgical Engineering Department

EFFECTS OF WELDING VARIABLES ON PROPERTIES OF SUBMERGED ARC WELDS

A Thesis Submitted to
Department of Metallurgical Engineering
Faculty of Petroleum and Mining Engineering
Suez Canal University

For

The Master Degree of Science

In

Metallurgical Engineering

By

Mohamed Ibrahim EL-Dessoky Husseiny

(B. Sc. in Metallurgical Engineering)

Supervised by

Prof. Dr. / M. I. Abbas

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Faculty of Petroleum and Mining Engineering
Suez Canal University

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Welding Technology & Inspection Department
Central Metallurgical Research and
Development Institute

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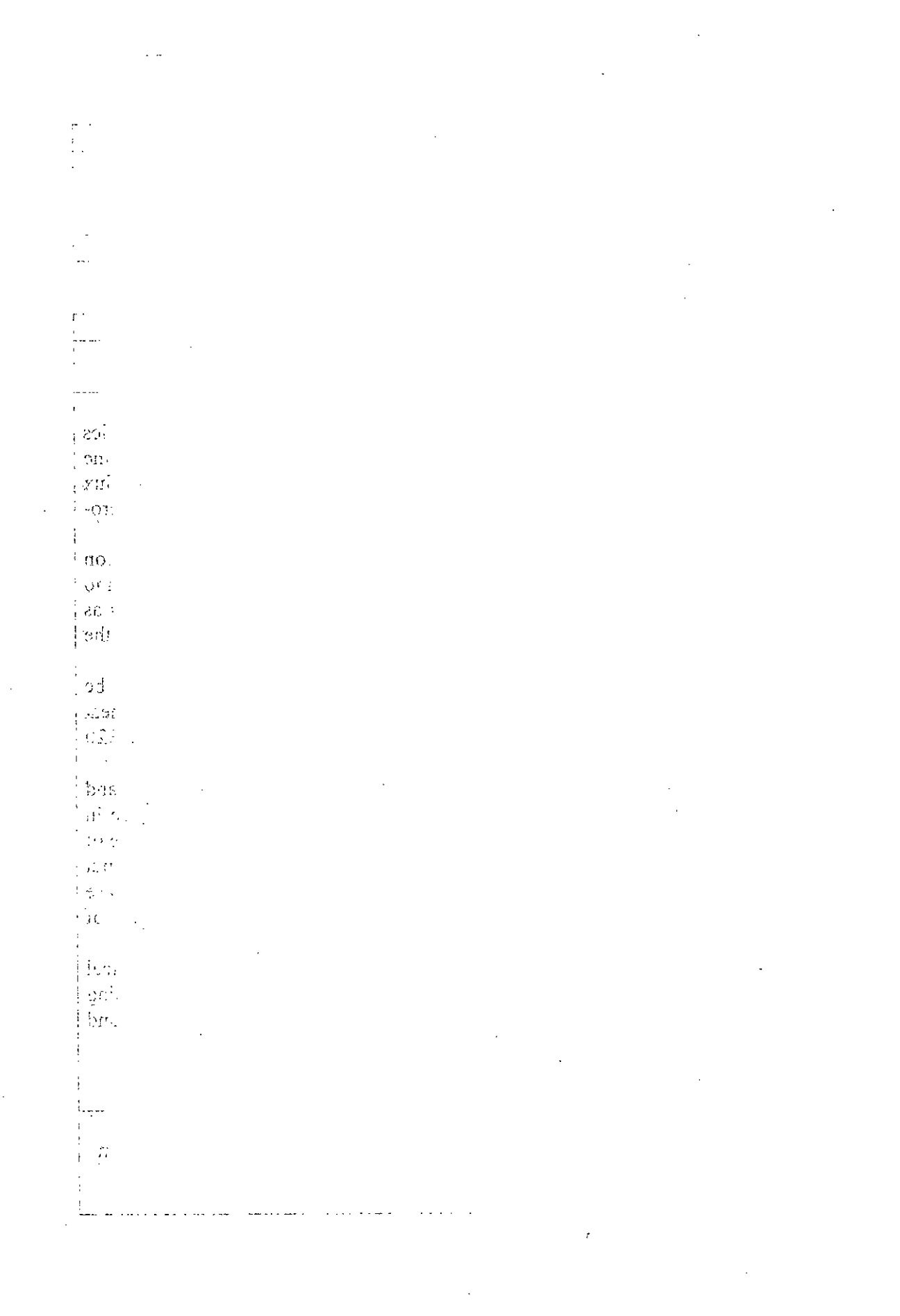
2007



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Degree: M. Sc. in Metallurgical Engineering

Date: 2007

Language: English

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Abstract:

This study was carried out to investigate the effects of welding variables such as voltage, current & speed in terms of heat input and to clarify the influence of titanium in weld metals, added in a form of Fe-Ti to the flux during submerged welding process, on structure and properties of boron micro-alloyed steel welds.

Two welding conditions have been carried out, first welding condition was performed with varying heat inputs and without the addition of titanium to the flux, second welding condition was prepared with varying heat inputs as that were used in the first condition and with the addition of titanium to the weld metal via the flux.

Radiography (using Gamma rays) of the weldments has been done to be sure that they are free of discontinuities and other internal defects. The heat input 840 J/mm showed lack of penetration while heat inputs 1260 & 1320 J/mm showed severe under cut and burn through respectively.

Chemical composition of the weld metal, mechanical tests and metallographic investigation were carried out. The results showed increase in manganese, silicon and titanium content in the weld metals with the increase of heat input. Hardness and toughness increased with the increase in heat input and they were higher in case of adding titanium to the weld metal. An increase in acicular ferrite with increasing heat input was observed. The percentage of acicular ferrite was higher when titanium was added to the weldment.

Addition of titanium to the weld metal enhanced the mechanical properties especially the toughness due to the formation of Ti- containing inclusions which work as nucleation sites for acicular ferrite formation and hence higher performance in lower temperatures.

Key Words:

1. Acicular ferrite 2. Toughness 3. Heat input 4. Titanium rich inclusion
5. Submerged arc welding 6. Microstructure 7. Mechanical properties

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ABSTRACT

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