



شبكة المعلومات الجامعية  
التوثيق الإلكتروني والميكروفيلم

# بسم الله الرحمن الرحيم



**MONA MAGHRABY**



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التوثيق الإلكتروني والميكروفيلم



# شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



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# جامعة عين شمس

## التوثيق الإلكتروني والميكروفيلم

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**MONA MAGHRABY**



# **CORROSION OF WELDED CARBON STEEL PIPES IN OIL PRODUCTION FIELDS AND ITS MITIGATION**

By

Mazen Mahmoud Mohamed El Morsy

A Thesis Submitted to the  
Faculty of Engineering at Cairo University  
in Partial Fulfillment of the  
Requirements for the Degree of  
**DOCTOR OF PHILOSOPHY**  
in  
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FACULTY OF ENGINEERING, CAIRO UNIVERSITY  
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Under the Supervision of

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**Title of Thesis:**

Corrosion of Welded Carbon Steel Pipes in Oil Production Fields and its Mitigation

**Key Words:**

Corrosion; Preferential weld; Flow induced; Carbon steel; Oil

**Summary:**

In oil production fields, corrosion of welded carbon steel pipes frequently occurs in areas near welds. Corrosion in other areas may take place at a lower frequency and with a lower detrimental effect. In this thesis, a field survey is conducted of eight oil petroleum fields over a period of seven years. Testing of specimens of carbon steel welded joints is carried out under simulated conditions. This study investigates the predominated corrosion damage mechanisms in welded carbon steel pipes. It examines the critical factors triggering corrosion mechanisms and the techniques for corrosion monitoring and mitigation. Flow-induced corrosion and preferential weld corrosion were found to be the most effective mechanisms compared to pitting and microbiologically induced corrosion. Detrimental factors of corrosion mechanisms include flow rates and changes in process parameters of pH, fluid resistivity, and some anion concentrations. The corrosion mitigation was achieved by increasing the dosage of injected corrosion inhibitors.

## **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.

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