



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم



HANAA ALY



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شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



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OPTIMIZATION OF RESOURCES CONSUMPTION FOR CLEANING IN PLACE OF (CIP UNITS) IN DAIRY PLANTS

By

Heba Allah Ibrahim Abdel Rehim

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
Chemical Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Title of Thesis:

Optimization of Resources Consumption for Cleaning in place of (CIP Units) in Dairy Plants

Key Words:

Optimization of CIP Unit; CIP System; water & energy consumption; cleaning parameters; protein concentration.

Summary:

The goal of the present thesis is the optimization of water and energy consumption, in Clean-In-Place (CIP) units in dairy plants, without reduction of the cleanliness level. This was done by studying the different parameters that control the cleaning process namely, temperature and time.

The deposits formed on the inside surface of the equipment as the result of the production processes are removed, during the rinsing process, by cleaning detergents. The degree of cleanliness was tested by measuring protein concentration, conductivity, pH value and swab test, where the latter was used to test for the existence of bacteria. The results showed that it is possible to decrease the water rinse time by 100 seconds/cycle and the temperature by 10 or 15 degrees for some products without negatively affecting cleanliness level, resulting in water and energy savings.

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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Dedication

To my parents, Professors who are always supporting me to complete my thesis and in every step in my life especially my father who is the main reason and inspiration and gave me love and strength when I thought of giving up.

I'm grateful to you and I wish you could be with me but I know that your kind soul support me.

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Nomenclature

CIP Clean in Place.

COP Clean out of Place.

UHT Ultra High Temperature

IDF International Dairy Federation

OH&S Occupational Health and Safety

SME Small and Medium Enterprise.

tT Total Cleaning time.

EPA Environment Protection Authority.

TDS Total Dissolved Solids.

TSP Tri sodium phosphate.

EC Electrical Conductivity.