



**Maintenance Management for the Replacement of the
Governmental Heavy Service Equipment**

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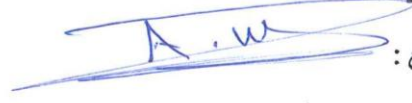
A Thesis

**Submitted to Faculty of Engineering as a Partial Fulfillment of the
Requirement for Master Degree in Engineering Project Management**

December 2019

نموذج التفويض

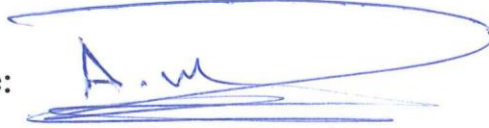
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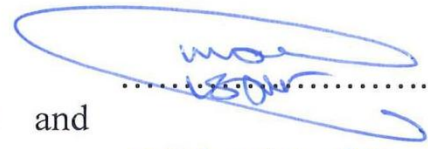
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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

﴿ يَرْفَعُ اللَّهُ الَّذِينَ ءَامَنُوا مِنْكُمْ وَالَّذِينَ

أُوتُوا الْعِلْمَ دَرَجَاتٍ وَاللَّهُ بِمَا

تَعْمَلُونَ خَبِيرٌ ﴾

[سورة المجادلة: 11]

DEDICATION

To my mother

To the soul of my father

To my brothers and sisters

To my wonderful wife

To my children Mustafa , Noor Al-Huda and Abd Al-Rahman

To my great family

With love

ACKNOWLEDGEMENT

I wish to express my deepest respect and sincere appreciation to my family for their kindness and encouragement throughout my undergraduate and graduate studies.

I would like to express my sincere thanks and deep gratitude to my supervisor, Dr. Rami A. Maher, for his valuable guidance, constant support and understanding throughout the present work, as well as for his encouragement, suggestions and utmost effort and interest that contributed to the successful completion of this work.

Lastly, I wish to express my thanks to all my colleagues for their support and for giving me the feeling of being a part of a team whenever we worked together.

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LIST OF ABBREVIATIONS

Symbol	Meaning	Units
BV_n	Book value (market value) at n th year	ID
$C_{(T,I,S)}$	Cost of tax, insurance and storage	ID
Ta_r	tax rate	ID
In_r	insurance rate	ID
St_r	storage rate	ID
C_{ol}	Cost of oil per liter	ID
D_f	Depreciation factor	-
D_n	Depreciation amount	ID
DB_f	Decaying balance factor	-
C_{fh}	Hourly fuel cost	ID
F_{cl}	Cost of fuel per liter	ID
I_C	Initial cost	ID
L_c	Lubricator consumption	Liter/hour
L_{rc}	Lifetime repair cost	ID
LCC_n	Expense cost	ID
M_{rc}	Maintenance and repair cost per hour	ID
O_c	Hourly operator's wage cost	ID
P_{avg}	Average annual cost	ID
T_{HTWC}	Total tire wear cost for all positions	ID
T_{LF}	Tire life factor	-
T_{rc}	Tire repair cost	ID
T_{wc}	Tire wear cost separately calculated depending on position (front, rear, middle)	ID
T_{wf}	Tire wear factor based on the position of the tire	-
TT_c	Total tire cost per hour	ID
W_h	Working hours per year	Hour

<i>AFC</i>	Average fuel consumption	-
<i>C</i>	Capacity of crankcase	Liter
<i>CF</i>	Combined factor	-
<i>N</i>	Time variable	Year, month, day
<i>Kw</i>	Rated power of engine	Kilowatt (kW)
<i>P</i>	Useful life	Year
<i>S</i>	Salvage value	ID
<i>Sy</i>	Sum of year digits	-
<i>T</i>	Number of hours between oil changes	Hour
<i>TF</i>	Time factor (operating efficiency)	-

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ABSTRACT

It is the responsibility of engineers at the Machinery Division and the Central Workshop Division in the municipality to decide on determining the appropriate time for machinery or equipment replacement. The criterion of replacement states that the annual deterioration of machinery and equipment in the governmental sector is 10%. After that, machinery and equipment are sold or leased according to the applicable law of sale and lease of state assets. The selection of machinery and heavy equipment as well as specialized machines occurs according to complex economic analysis and operations, since the selection process plays an important role. It is essential in the success of municipal service projects, which are vital for the whole community in the city. The focus is on correct maintenance procedures and economic analysis in order to determine costs and optimize operations. The aim of this research is to identify the economic life of heavy and specialized machinery and equipment. This is achieved through designing and applying an integrated model covering all expenses and maintenance costs. The proposed model is then applied using real data, which are obtained from Al-Fallujah Municipality- a town in west of Iraq.

The proposed model has been developed using MATLAB and is intended to provide engineers and workshop managers with confidence in relation to the point when machinery or equipment approach the end of their optimal economic life and should be partially or completely replaced.