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بسم الله الرحمن الرحيم

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التوثيق الالكتروني والميكروفيلم

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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%

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بعض الوثائق الاصلية تالفة

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بالرسالة صفحات لم ترد بالاصل

ص ٩٩

AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
AUTOMOTIVE DEPARTMENT

OPTIMUM OPERATING COSTS OF CITY BUS FLEET

BY

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M. Sc. Mechanical Engineering, 1981

A Ph. D THESIS

SUBMITTED IN FULFILLMENT OF THE REQUIREMENTS OF THE Ph. D DEGREE IN MECHANICAL ENGINEERING (AUTOMOTIVE)

SUPERVISED BY
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CAIRO - 1999

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ص

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STATEMENT

This dissertation is submitted to Ain Shams University for The degree of Doctor of Philosophy in Mechanical Engineering (Automotive Section).

The work included in this thesis was carried out by the oather in the Automotive Engineering Department , Faculty of Engineering , from 1993 to 1999 .

No part of this thesis has been submitted for a degree or a qualification at any other university or institution.

Date : / / 2000

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ABSTRACT

The Operating costs represent an effective share of the total costs of city bus fleet. The management of the maintenance as a cost center is the focus that enables the optimization of operating costs. The study presents a new methodology to optimize the operating costs of city bus fleet. The study was carried out on the fleet of Greater Cairo Bus Company in order to establish a new system to optimize the operating costs.

The analysis is based upon actual data collected for the chosen sample of 143 buses during four years. The data proved that there were inaccuracy in the expenditure spare parts system of the replacement stores led to discrepancies in values of total operating costs of the bus. A new suggested system was applied to reanalyze the data. The new analysis proved that the average total operating costs of city bus increase sharply after ten years of operation. Further, the main components of operating costs in a descending order are: Tyres, engine and gearbox. The costs of these components were studied in details.

The methodology of reliability and hazard rate were applied on engine and gearbox data to calculate the optimal service life for new or renewed engine or gearbox.

- The analysis of engine data showed that the mean time to failure (MTTF) of air-cooled engine, which is mounted on NASR 811 bus is 580364 km and its unit cost is 0.16093 L.E/km. The MTTF of water-cooled engine which is mounted on NASR 871 bus is 682859 km and its unit cost is 0.099 L.E /km. The analysis proved that water-cooled engine is more suitable for city bus especially in dusty environments.
- The analysis of gearbox data showed that MTTF of gearbox, which is mounted on NASA 811, is 414016 km and its unit cost is 0.0837 L.E/km. The MTTF of gearbox, which is mounted on NASR 871 bus, is 735619 km. and its unit cost is 0.1025 L.E/km
- Relationships between service life of new units and their subsequent overhaul service life were developed.
- The study recommended performing the preventive maintenance for engine or gearbox before first natural failure. The timing of the first preventive maintenance for both the two engines and gearboxes was calculated according to the hazard rates methodology.
- For the tyres, which are the main costly item, a survey was done to get the real statistical distributions for number of passengers and speeds. The survey was applied on a sample of the fleet representing the operation conditions. The main parameters affecting the service life of the tyre were discussed. A general formula for service life of tyre based on inflation pressure, applied load and speed of bus has been established.
- A guideline to adjust the inflation pressure was given with a new formula and charts. A calculated case study on one route of the company fleet proved that incorrect inflation pressure decreases the tyre service life by about 30 % of its normal service life.

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