



# Effects Introduction of New Method for Servicing and Maintenance of Automobile Engines in Nigeria Government Agencies, Case Study: Maritime Academy of Nigeria, Oron, Akwa Ibom State, Nigeria

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**Abstract:** *This research investigates preventive maintenance management of automobile engines in Nigeria Government agencies, the case study of maritime Academy of Nigeria, Oron. A budget based optimization methodology is used by putting into consideration the age of the equipment (automobile Engines obtained from the institution maintenance data). This is necessary to provide cost effective maintenance management / replacement programme for critical components of automobiles engines and to reduce the cost of maintenance and quick damaging of automobile engine. The data were analyzed using budget optimization methodology. The findings show that Maritime Academy of Nigeria has been spending a lot of money on the maintenance of their automobile engine, that a lot of vehicle of less than three year of purchasing has been scrapped because of poor maintenance, the Maritime Academy of Nigeria did not have standard workshop up till date. The results provide effective cost and reliability template which can be used to perform a budget based maintenance planning programme in the institution and in all Nigeria Government agencies.*

**Key words:** *Preventive Maintenance; Reliability; Automobile engines; periodic maintenance; Maritime Academy*

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## INTRODUCTION

In engineering field we have different type of maintenance which are:

**Breakdown Maintenance (BM):** This refers to the maintenance strategy, where repair is done after the equipment failure/stoppage or upon occurrence of severe performance decline.

**Preventive Maintenance (PM):** This concept was introduced in 1951, which is a kind of physical check up of the equipment to prevent equipment breakdown and prolong equipment service life. PM comprises of maintenance activities that are undertaken after a specified period of

time or amount of machine use (Herbaty, 1990). During this phase, the maintenance function is established and time based maintenance (TBM) activities are generally accepted (Pai, 1997). This type of maintenance relies on the estimated probability that the equipment will breakdown or experience deterioration in performance in the specified interval. The preventive work undertaken may include equipment lubrication, cleaning, parts replacement, tightening, and adjustment. The production equipment may also be inspected for signs of deterioration during preventive maintenance work.

**Predictive Maintenance (PdM):** Predictive maintenance is often referred to as condition based maintenance (CBM). In this strategy, maintenance is initiated in response to specific equipment condition or performance deterioration (Vanzile and Otis, 1992).

**Corrective Maintenance (CM):** This is a system, introduced in 1957, in which the concept to prevent equipment failures is further expanded to be applied to the improvement of equipment so that the equipment failure can be eliminated (improving the reliability) and the equipment can be easily maintained (improving equipment maintainability) (Steinbacher and Steinbacher, 1993).

**Maintenance Prevention (MP):** Introduced in the 1960s, this is an activity wherein the equipment is designed such that they are maintenance free and an ultimate ideal condition of "what the equipment and the line must be" is achieved (Steinbacher and Steinbacher, 1993).

**Reliability Centered Maintenance (RCM):** Reliability Centered Maintenance was also founded in the 1960s but initially oriented towards maintaining airplanes and used by aircraft manufacturers, airlines, and the government (Dekker, 1996). RCM can be defined as a structured, logical process for developing or optimizing the maintenance requirements of a physical resource in its operating context to realize its "inherent reliability", where "inherent reliability" is the level of reliability which can be achieved with an effective maintenance program.

**Productive Maintenance (PrM):** Productive maintenance means the most economic maintenance that raises equipment productivity. The purpose of productive maintenance is to increase the productivity of an enterprise by reducing the total cost of the equipment over the entire life from design, fabrication, operation and maintenance, and the losses caused by equipment degradation.

**Computerized Maintenance Management Systems (CMMS):** Computerized maintenance management systems assist in managing a wide range of information on maintenance workforce, spare-parts inventories, repair schedules and equipment histories. It may be used to plan and schedule work orders, to expedite dispatch of breakdown calls and to manage the overall maintenance workload.

**Total Productive Maintenance (TPM):** TPM is a unique Japanese philosophy, which has been developed based on the Productive Maintenance concepts and methodologies

With all the explanation above you will discover that the best method to adopt in the institution [MAN, Oron] is preventive method so that the entire vehicle and the equipment will have long life span and also preventing our vehicle from breakdown.

**METHODOLOGY**

Data for this research were collected from both primary and secondary sources. The primary information was obtained from maintainers, supervisors, engineers and managers. This information include: wear and tear, Engine failure on the road or at a particular position and what it can cause if there is continuous failure. The main data were obtained from the log book for a period of one month. This data include the Movement covered, Mileage before, Mileage After, Mileage covered, ten critical parts were selected for the study. This data formed input into a maintenance and replacement model developed by Kamran (2008).The information was used to predict future maintenance planning for the Automobile engines (Vehicles) in the next One with a given budget and the objective of reducing maintenance cost and increasing the reliability of the Automobile Engines used by the institution. The methods used in solving the problem are generalized reduced gradient (GRG) and simulating annealing (SA).

**RESULT AND DISCUSSION**

Let me give us an example based on the research I made before I was invited to join the transport board committee. With the help of Mr. Victor Smart and Mr. Uwem (drivers), I used Haice bus of plate number 19D02FG as a case study on the 11/06/13 the vehicle was serviced with the mileage number of 52907KM. here are the detailed movement of the vehicle and the mileage covered as follow.

Table I for the Toyota Hiace Bus in Maritime Academy of Nigeria according to the driver

Date	Movement covered	Mileage Before	Mileage After	Mileage covered	Remark
12/06/13	MAN-Area Command MAN-Airport) 2x Airport-MAN) 2x	52907	53156	249km/h	
13/06/13	MAN-Airport Airport-MAN MAN-Calabar Calabar-MAN	53156	53572	416km/h	
14/06/13	MAN-Airport Airport-Uyo Uyo-Le-Meridian Le-Meridian-Uyo	53572	53816	244km/h	

<b>15/06/13</b>	MAN-Ikotekpene Ikotekpene-Calabar Within Calabar-Tinapa	53816	54244	428km/h	
<b>16/06/13</b>	Tinapa-Town Tinapa-MAN	54244	54521	277km/h	
<b>18/06/13 And 19/06/13</b>	MAN-Le-Meridian) 2x Le-Meridian-MAN) 2x Facilities Tour	54521	54930	409km/h	
<b>20/06/13</b>	MAN-Airport) 2x Airport-MAN) 2x MAN-Sky point, Shuttle MAN-Uyo Uyo-MAN	54930	55169	239km/h	
<b>21/06/13</b>	Within MAN-Skypoint	55169	55245	76km/h	
<b>22/06/13</b>	MAN-Biase LGA Cross River State	55245	55738	493km/h	
<b>24/06/13</b>	MAN-Calabar Calabar-MAN	55738	56218	480km/h	
<b>25/06/13</b>	MAN-Uyo Uyo-MAN	56218	56618	400km/h	
<b>28/06/13 29/06/13 30/06/13 01/07/13</b>	MAN-Calabar Calabar-Biase LGA Biase-Calabar Dropping of guest, Hotel-Oron Beach Hotel-Airport-Calabar Calabar-MAN	56618	57785	1167km/h	

The table above showed the movement and mileage data of vehicle 19D02FG, which also applicable to all vehicles in academy.

With all this we will see that our vehicle in academy cannot undergo **Periodic Maintenance**. The Haice bus 19D02FG is overdue for servicing with the total mileage covered between 12h June to 1<sup>st</sup> July2013, compare to last servicing date 11/06/13, we will observe that is not up to a month, and as at the time am compiling this report the current mileage number is 57785-52907 is equal to 4878 which can cause wear and tears of the vehicle and can cause the vehicle to breakdown at anytime, considering periodic servicing with the data at hand the vehicle is unsafe condition.

Due to this, I hereby suggest the lasting solution for vehicle maintenance to the chief executive and the management boards the methods that our vehicle in Academy can adapt with, which is **Preventive Methods** as explained above.

The method stated above (**Preventive Methods**) at the beginning will give all the vehicles in Academy long life and the cost of maintenance will be minimal at the long run, it will be a lot of

fortunes to the Academy and all Agencies and Parastertal in Nigeria, if they can follow the right procedure Before this preventive maintenance could be achieved we need something to put in place so that the institution and any others like Agencies and Parastertal will not be at lost, which are.

1. **Log Book:** There will be a log book for all vehicle users (Driver) and they shall be taught on how to use the log book so that when the car reaching the maximum mileage to service and to replace any other spear part in the vehicle, the driver shall inform the supervisor.
2. **Workshop/Seminar:** There should be workshop for all drivers by inviting the VIO, Road safety and any other body that are expert in the field. So that they will be able to know road wordiness and how to drive safety within and outside Academy even outside the state, to note th sound of a vehicle when it changes, when the friction take place, when any indication shown on the dash board.
3. **Re-organized & Re-modernized:** The auto mechanics workshop in Maritime Academy of Nigeria Oron, need to be re-modernized that all the equipment will be well fixed and the maintenance of **ALL ACADEMY VEHICLES** will be taking within academy. So as to reduced the cost of maintenance.
4. **Training:** Training the, technician and craftsman (Mechanics) in any standard Toyota company so that they will be able to bring out up to standard repairs. And all academy vehicle will be in good condition for long period of time
5. **Materials & Spear part:** With the availability of material in the store by sending expert to go and bring those material to the academy so that bad material or spear part will not be supply and also to get the required mechanical tools and spear part material like engine oil, oil filter, fuel filter, top cylinder gasket. etc. with this entire academy vehicle will have along life span.

## CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

The following conclusions were made:

- i. Preventive maintenance can be used to determine the life span of academy vehicle. This can assist management in taking decisions on future academy vehicle purchase, operation and maintenance
- ii. The Management fleet, pool and the other vehicle will be maintain within Academy in a good condition
- iii. The Academy vehicles will have the higher average of operation and availability.

### Recommendations:

Due to this I brought to the Nigeria Government Agencies a new method of maintenance called **Preventive Method**. The following recommendations are made:

- i. There is need for the institution (Maritime Academy of Nigeria, Oron) to keep good maintenance record of vehicle. This will serve as a data base for information
- ii. Good maintenance schedule and practice should be developed for equipment. This will reduce avoidable failure and increases vehicle availability.
- iii. Feedback between the driver and the Maintenance department should be encourage to track vehicle performance
- iv. There is need for the management of the institution (Maritime Academy of Nigeria, Oron) to adopt a structured maintenance information system presented in this research project.

Calling me to defend this for better explanation and understanding will also be welcome. **IT IS POSSIBLE, I CAN DO IT! YOU CAN DO IT! CAN DO IT!!!**

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