

# Investigation into the causes of propeller shaft failure of dong feng trucks



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The rated power generated from the engine of a heavy duty vehicle can only become useful when effectively transmitted from the engine via the fly wheel to the transmission system of the truck and finally to the final drive. The propeller shaft or the drive shaft which is the mechanical component used for transmitting torque and rotation is used in transmitting these generated power to the final drive.

However, when the Ghana Armed Forces introduced the Chinese made Dong Feng trucks which are five ton troop carrying vehicles (TCVs) for its operations, their propeller shafts recorded a high rate of failure. This inevitably affected the morale of troops and the operations of the Ghana Armed Forces. Some drivers of the truck fearing the propeller shaft failure could result in accident, hanged nylon rope or chain under the trucks to prevent a failed shaft from striking the ground.

Below are pictures to that effect. This project therefore aims at identifying the causes of the failures of propeller shafts and recommend mitigating measures to them. Fig. 1. 1 Nylon Rope Beneath the Propeller Shaft 1.

2Objectives The objectives of this project work are: •To identify the causes of propeller shaft failure of heavy duty trucks at the Base Workshop. •To recommend mitigating and preventive measures to the problems. 1.

3Justification

It is anticipated that the findings of this project will bring to the knowledge of truck owners and users especially the Ghana Armed Forces the causes of propeller shaft failures and recommended measures to prevent them from occurring. 1. 4MethodsUsed The methods to be adopted include: •Visit to the

Dong Feng Base Workshop, Burma – Camp. • Consultation with Lecturers at the Mechanical Engineering Department of UMaT, Tarkwa. • Data collection and analysis. 1. 5 Facilities Used for the Research The facilities to be employed include:

The Base Workshop. • Relevant literature review. • Library facilities at UMaT.

Internet facilities at UMaT. 1. 6 Scope of work This project is limited to investigations into the causes of propeller shaft failures on Dong Feng trucks at the Base Workshop, Burma-Camp, Accra, Ghana. 1. 7 Work Organization

This project work is organized into four chapters as follows: Chapter one consists of the statement of the problem, objective, methods used, research facilities used, justification of the project objectives, scope of work and work organization. The second chapter introduces relevant information about Base Workshop by way of an overview and some department at the Base Workshop and their maintenance procedure.

The third chapter gives a brief introduction to the truck and its technical data, detailed description of power train system and a general overview of the propeller shaft universal joint, General Causes of Propeller Shaft Failure and Mitigating Measures carried out in this chapter. Chapter four will deal Investigation at the Base Workshop into the causes of propeller shaft failure, Outcome of the Investigation, conclusions and recommendations.

## CHAPTER 2 RELEVANT INFORMATION ABOUT BASE WORKSHOP (B/WKSHP) 2.

1 Introduction After the first and second world wars, the Army thought of forming a workshop to undertake repair work in the Army.

In 1946, a nucleus workshop was formed and located at Bubuashie at Accra to undertake the repairs of the Royal West African Frontier Force's (RWAFF) weapons and equipments. Later it moved to a new site at United Africa Company (UAC) Workshop, opposite Accra Railways Station. In 1950, it was designated as No. 1 Station Workshop, West Africa Electrical and Mechanical Engineering (WAEME) and moved to a new location at Duala barracks, Giffard Camp, now Burma Camp. In 1952, the No. 1 Station Workshop was re-designated as No. 4 Command Workshop with 300 military and civilian personnel.

The vehicle is received at this outfit, an inspection is carried out in the presence of the driver to check the fuel level, notice is taken of any dents or bodily damage to the vehicle and the contents is also checked for the presence of tools, car jack, fire extinguisher among others after which the vehicle is sent to the servicing section. 2. 3. 3Servicing Section Here, all the various types of servicing in the workshop are carried out. It is also from this outfit that vehicles for repairs and maintenance are sent to the appropriate floors for work to be carried out.

After the vehicles have been worked on, they are brought back to the servicing section, where personnel cross check with the job card to ensure that all that is on the job card was done before it is sent back to R and I where checks are once again conducted to ensure that the fuel gauge, tools fire extinguisher dents among others are intact as before the vehicle was sent to the workshop floor. 2. 3. 4The Workshop Floor (Civil Pattern, Steyr, Land Rover, Tata, Heavy sections) This is where the main vehicle repair works takes place.

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The workshop floor is divided based on specialization of personnel according to vehicle type. There is the civil pattern section that handles all civil pattern vehicles on charge to the Ghana Armed Forces, the steyr section, which handles only steyr trucks. Land Rover section handles only Land Rover as the name implies. The TATA section is responsible for buses and last but not the least, Heavy section that handles Dong Feng trucks (Arkoful, 2000).

CHAPTER 3 LITERATURE REVIEW 3. 1Introduction In recent times, there have been many propeller shaft failures on the Dong Feng trucks at the Base Workshop, Burma- Camp, Accra.

This could have been avoided with the proper care and attention to details. An investigation at the workshop into the causes of propeller shaft failures was undertaken to obtain an idea of the most common causes of propeller shaft failure of the Dong Feng truck. The results of this investigation indicate two main causes of the shaft failures at the Base Workshop i. e. Improper Assembly and Poor Lubrication. 3. 2The Dong Feng EQ1093F6D Truck The Dong Feng EQ1093F6D 4x4 is a five-ton logistics and troop carrying vehicle (TVC) manufactured by The Dong Feng Motor Corporation of China.

The original EQ240 vehicle, powered by EQ6100/6105 petrol engines, has been continually updated and a number of more `new technologies have been included into the design since the 1980s. The current model, designated EQ1093F6D is powered by an improved Cummins 6BT5. 9 5. 88-litre diesel engine. The layout of the truck is entirely conventional, with the engine forward, the steel cab seating the driver and two passengers, and the load area to the rear. A conventional C-section chassis is used, with beam-

type axles sprung by leaf spring suspension. The standard cargo body of the truck has a steel and wood floor, steel side racks and a tailgate.

Optional equipment includes a power take-off and a 4, 500 kg winch mounted behind the front bumper (Anon. , 2010). The People's Liberation Army (PLA) of China uses a large number of these vehicles, which are similar in appearance to a wide variety of Dong Feng bonneted commercial 4×2 trucks. However, it was introduced into the Ghana Armed Forces a few years ago. The Dong Feng Motor Corporation was originally known as the Second Automobile Works, and was established in 1967 by relocating part of the facilities and technicians of the First Automobile Works to the rural area in Hubei Province.