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Investigation into the causes and effects of Automobile oil leakages in the Cape Coast Metropolis

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ABSTRACT
Engine oil is use in automobile engines leak through unapproved channels. The leakages results to weakening automobile engines, noisy engines, overheating, oil contamination, poisoning and environmental pollution. Automobile metal engine parts are in motion with each other resulting to friction and lubricants are substances that reduce the friction. The lubricant is the engine oil. The act of application of lubricant to reduce friction is known as lubrication. The base oil which is the major component of the engine oil is a fractional distilled product of underground crude oil. Additives are added to the base oil to make it more lubricative and achieve higher viscosity index. The automobile lubrication is being carried out by its lubrication system. This system when faulty is service by automobile mechanics
Keywords: Lubricant, Engine oil, Leakages, Pollution, Pump

INTRODUCTION

Leakages are passage of fluid automobile engine oil through unapproved holes, spaces, cracks, channels, among others. Leakages occur in all aspects of life, this article emphasizes on the leaking of engine oil from automobile engines. Automobile mechanics or technicians at Siwdo - Kokompe in Cape Coast have learnt and develop different strategies mechanically to solve the problems of leakages. The problems of automobile engine oil leakages have become rampant so this article carries information on investigation of the causes of these leakages as well as suggestions of possible remedies to alleviate the problems. These leakages render the automobile engines weak or spoilt due to overheating, contamination, noise generation, among others. Engine oil leakages from automobiles pollute rivers, streams, among others when they are washed away by moving water which affects plants and animals. These leakages affect aquatic life as well as poisoning of fishes for human consumption. Metal parts of the automobile engine are in contact and moving resulting to friction and heat generation. The substance that is used to reduce the friction and heat generated is known as lubricant and this process is lubrication. The lubricant ranges from oil, grease, graphite, among others in the states of gas, liquids and semisolids to solids. The objective of this article is to investigate into the causes and effects of automobile oil leakages in the Cape Coast Metropolis.

REVIEWED LITERATURE

Lubrication

Lubrication originates from a Latin verb to make slippery which applies to automobile engineering perfectly. Lubrication is the introduction of a substance between the surfaces of moving parts to reduce or minimize friction and dissipate heat. Lubrication permits the free motion of mechanical devices, unseizing of metal parts, equal expansion, reduce friction due to wear and tear, reduce deformities resulting from heating as well as eliminate engine damages due to abrasion. Motor or engine oil is the type of lubrication oil use to lubricate internal combustion engines. Motor or engine oil, apart from lubricating moving parts, also cleans, inhibits corrosion, improves sealing as well as cools engines by carrying heat away from moving parts. The engine oil is liquid at room temperature, viscous and insoluble. The engine oil also functions by creating separating film between surfaces of adjacent moving parts to minimize direct contact between them, decreasing heat cause by friction as well as reducing wear. Almost all types of engine oil are refined products of the fractional distillation of petroleum or underground crude oil. This product is known in the industries as base oil. This base oil is relatively heavier and consists of eighteen (18) to thirty-four (34) carbon atoms per molecule of hydrocarbons. The viscosity of the automobile engine oil is express as the thickness or resistance to flow and it is sufficient enough to maintain satisfactory lubrication. Engine oil also has properties which prevent deposition of carbon, soot as well as carrying away of harmful substances from incomplete combustion to prevent metallic components by acids formation. Automobile engine oil also resists oxidation which causes sludge and lacquers. Viscosity index is a measure of how the viscosity of automobile engine oil changes as temperature changes. Higher viscosity index of engine oil indicates that the viscosity change is less with temperature changes than with lower viscosity index. The American Petroleum Institute (API) and the Society of Automobile Engineers (SAE) are the two credible organizations that have establish standard codes for the grading of engine oils in terms of viscosity. These viscosity grading are substantiated through test. Therefore, engine oils use by most automobiles are of single viscosity ratings of SAE 10, 20, 30, 40, and 70. The higher the viscosity rating, the

higher the thickness when heated. Thus engine oils with higher viscosity numbers can endure extremely higher temperature situations than those having lower viscosity ratings. Oils having multi-viscosity ratings are chemically modified to withstand both low and high temperature conditions. Thus engine oil having viscosity rating as SAE 2OW - 50, which means this engine oil flows and protect the automobile engine at low as well as very high temperatures. The SAE rating for viscosity of engine oil is more popular than API viscosity ratings of engine oil.

Components of automobile engine oil

The base oil alone do not contain much viscosity properties for lubrication. Therefore, improving viscosity chemicals known as additives are blended with the base oil to form the actual engine oil for effective lubrication in automobile engine. These additives are (detergents or dispersants), viscosity index improvers, four point depressants, extreme pressure additives, anti-wear additives, corrosion inhibitors and oxidation inhibitors. Dispersants keeps particles of contaminants and carbon suspended within the engine oil. As the engine and foam gets heated, viscosity index improvers enables the automobile engine oil retain enough thick film. At cold temperatures, the four point depressants permits engine oil to be thin adequately to flow to all parts of the automobile engine. When heavy loads are applied to engine oil, extreme pressure additives aid to protect engine oil from being squeezed out of oil clearances. When moving parts of the automobile engine rubs or touch under heavy load condition, anti-wear additives prevents wear. Foam inhibitors minimize the mixing of air and the oil which oxidizes readily. The chemical breakdown of engine oil or oxidation is prevented by oxidation inhibitors. Acids formation which damage metal parts are prevented by corrosion inhibitors. Lubricating oils produce solely from chemicals but not from natural mineral petroleum source are called synthetic or man-made oils and are relatively considered inferior. The two basic means of engine oil lost in automobile engines are leakages and burning in the combustion chamber.

Automobile engine lubrication system

The components of automobile engine lubricating system are:
Oil pan
Oil pump
Oil filter
Oil distributing system
Pressure indicator
Oil level indicator

Oil Pan

This is a reservoir for engine oil which is bolted to the crank case and having drain plug. The disconnection of the drain plug creates passages for the engine oil to drain out.

Engine oil pump

The automobile engine oil pump consists of the following parts given below:
Pick up and screen
Housing and cover
Gears and rotors
Oil pressure relief valve

The hollow oil pick is a flat cap mounted at a tube and with a screw on the cap to prevent large particles from entering the pump to damage the gears as well as the housing. Pickup tube provides channel to the intake. The housing cover houses the components of the automobile engine oil lubricating system. The pump has two gears meshed. One of the gears is driven by a shaft from the distributer driver gear. The operation of the pumps is such that the engine oil is forced up through the pickup to move around outside of the gear (teeth) by the aid of atmospheric pressure. This pressure forces the engine oil out upon reaching the out let of the oil filter. A relief valve prevents excess oil from entering. On the seat in the oil out let is a spring which holds a check valve. More oil pressure and force against the check valve enables the spring to push the valve open. This valve is a control link and allows enough oil to flow out.

Oil Filter.

In the lubricating system of the automobile engine is located the engine oil filter which is between the engine oil pump and the automobile engine parts that require lubrication. The core function of filter is to remove harmful particles from the engine oil. The filter is also screwed directly onto the side of the cylinder block of the automobile engine. The automobile oil filters consist of a pleated element made of special filtering paper inside a metal housing. The commonly modern full – flow oil filters have all the engine oil passing through the filter before flowing to all parts that are moving in the automobile engine. When excessive contaminants choke the engine oil filter, the unfiltered engine oil is channel through a bypass valve to the moving parts of the automobile engine.

Oil Distribution system.

Galleries are passage ways or channels through which the engine oil passes to the moving parts. The engine oil flows to the cylinder walls, piston pins, timing chain, gears, camshaft lubes, among others of the automobile engine.

Pressure indicator.

The engine of an automobile gets damage due to low engine oil pressure resulting to unavailability of the oil in the engine. A pressure sensor attach to the oil gallery serves as warning sign device during shortages. The sensor has a diaphragm which moves in accordance to pressure levels.

Oil level indicator.

The dipstick is a simple stick that extends downwards into the automobile engine oil supply. Accurate readings of the dipstick are obtained by cleaning before using and before starting the automobile engine. The dipstick is mark maximum and minimum levels.

METHODOLOGY

The quantitative approach was the research method adopted for this article due to the fact that substantive analysis, conclusion and recommendations must be made to signify that automobile engine oil leakages to the environment need to be worked on. Therefore, the data collection and its analysis was the most efficient means of making this research work a reality. The target groups for this research are drivers, passengers and automobile mechanics at Siwdo - Kokompe at Cape Coast in the Central Region was chosen because of the cluster of automobile mechanics there. This method of data collection involves questionnaires and interviews. The questions were administered to mechanics at Siwdo – Kokompe which covers about 99% of the mechanics there.

INFORMATION FROM DRIVERS

NAME OF DRIVERS	VEHICLE NUMBER	CAUSES OF OIL LEAKAGES	EFFECTS
Mr. Kingsford osei	GR 6822 Z	1. Damaged crown seal 2. Damaged gear box seal 3. Damaged shaft seal	1. Engine becomes weak 2. Environmental pollution
Mr. Ansah	GT 4437 R	1. Broken oil seal 2. Damaged crank and shaft seal 3. Oil reservoir not well sealed	1. Engine ceasing 2. Oil wastage
Mr. Owusu Danquah	GW 4448 R	1. Damaged fuel pump 2. Damaged crank seal and gear box seal 3. Loose bolt at lower base of engine	1. Engine damage 2. Engine weakens 3. Environmental pollution 4. Health hazards 5. Slippery roads
Mr. Attah Amoah	GW 4277 G	1. Loose engine pressure 2. Damaged crank sealing 3. Damaged engine sealing	1. Engine crash 2. Slippery roads 3. Environmental pollution
Mr. Hendrids	GW 5521 T	1. Too much oil in reservoir 2. Faulty oil gange 3. Broken crank	1. Weakens engine 2. Damages engine
Mr. Dadzie	AS 1032 W	1. Leaks in oil reservoir 2. Faulty oil gauge 3. Wring oil tunnel seal	1. Crash bearing resulting to engine damage and failure 2. Slippery roads
Mr. Dominic	WR 5211Y	1. Loose bolt valve 2. Leaking oil reservoir 3. Damage shaft sealing	1. Destruction of engine 2. Oil wastage
Mr. Kobinah	WR114 Q	1. Oil level too high 2. Leaking oil seal 3. Damaged crown seal	1. Engine becomes highly inflammable 2. Oil needs in engine
Mr. Sylvester	CR 3381 U	1. Oil reservoir not well covered 2. Blockage in oil reservoir 3. Uncovered oil seal	1. Jerking of engine 2. Incomplete combustion 3. Environmental pollution
Mr. Buada	GR 1052 – 09	1. Loose bolt and nut on oil reservoir 2. Oil level too high 3. Aging engine	1. Weaking of engine 2. Expensive maintenance 3. Environmental pollution
Source: Arthur's field work 2013			

INFORMATION FROM MECHANIC AT SIWDO – KOKOMPE

SHOP OWNERS NAME	SHOP NAME	CAUSES OF ENGINE OIL (LUBRICANT) LEAKAGES	EFFECTS OF ENGINE OIL (LUBRICANT) LEAKAGES
Mr. Obeng	Obengs Company	1. Damaged seal 2. Blockage in the ventilation valve 3. Damage of front and back 4. Crank sealing	1. Leaking oil makes engine to be dirty
Mr. Isack Quansah	Mr. T.T.'s	1. Oil level too high in the oil reservoir 2. Hardening of seals.	1. Engine operation may stop due to crashed bearing 2. Belt drive may be destroyed
Mr. Awudu	The Siwodo work shop	1. Broken crank sealing 2. Broken camshaft sealing 3. Weak sump gasket 4. Wrong lubricant been use	1. Engine becomes weak due to burning of bearing 2. Wasting of engine oil 3. Air pollution due to incomplete combustion resulting to health hazards
Mr. Peter	Siwdo Fitting shop	1. Faulty crank sealing 2. Too much dirt in engine 3. Loose gasket	1. Crashing of bearing 2. Engine damage 3. Environmental pollution by smoke 4. Poisoning
Mr. Anthony	Master Tony shop	1. Valve cover not well sealed 2. Weak gasket 3. Broken air valve 4. Weak and damage oil seal 5. Wrong lubricant been use	1. Noisy bearing 2. Burning of crank and main bearing 3. Ceasing of oil pump 4. Slippery road 5. Engine ceasing 6. Burning gasket

Source: Arthur's field work 2013

INFORMATION FROM PASSENGERS

NAME OF PASSENGERS	LOCATION	CAUSES OF OIL LEAKAGES	EFFECTS
Mr. Daniel Coleman	Cape Coast	1. Improper maintenance of engine 2. Faulty lubricating lines	1. Overheating heading to engine failure 2. Wear and tear 3. Environmental pollution
Mr. One-Stone	Cape Coast	1. Loose drain plugs on crankcase 2. Crankcase on crankcase 3. Damage on fuel pump and moving parts.	1. Engine ceases 2. Over hearting 3. Slippery roads
Mr. Ofori Bempong	Cape Coast	1. Loose or worn out seals 2. Excessive filling of oil reservoir 3. Ramps pot holes on road can cause leakages	1. Engine break downs 2. Overheating due to friction 3. Environmental pollution
Mr. Isaac	Cape Coast	1. Worn out piston rugs 2. In proper tighting of sump plugs 3. Faulty cylinders and heat gaskets	1. Noisy engine 2. Overheating of engine 3. Ceasing of piston movement 4. Health hazards
Mr. E.T. Mensah	Cape Coast	1. Damaged engine 2. Damaged crankshaft seals	1. Engine ceasing 2. High oil consumption 3. Burnt oil in the combustion chamber produces hazardous pollutants
Mr. Manor	Cape Coast	1. Over usage of oil dirty 2. Dirty particles clogging oil tubes	1. Engine weakens 2. Slippery roads 3. Environmental pollution
Mr. Kofi Sniper	Cape Coast	1. Damaged sealant 2. Damaged oil tubes 3. Improper tindtitening of crankcase bolts	1. Over heating of leangines 2. Health hazards 3. Environmental pollution 4. Slippery roads
Mr. John Obo	Cape Coast	1. Oil level too high 2. Faulty engine 3. Loose gasket between contact surfaces	1. Engine weakens 2. No reliability of engine 3. Hazardous slippery surfaces
Mr. Collins Biney	Cape Coast	1. Weak or old oil tank 2. Damage tubes	1. Engine failure rate high 2. Environmental pollution
Mr. Joseph Duncan	Cape Coast	1. Tube and reservoir leakages 2. Aging tanks	1. Reliability of engine reduces 2. Engine break down

Source: Arthur's field work 2013

DISCUSSION

Information obtain from the automobile mechanics indicates that the causes of engine oil leakages from automobile engines are due to damaged oil seal, damaged crank sealing, high oil levels, wrong lubricant, weak sump, broken camshaft, dirty oil, weak gasket, broken valve, weak gearbox, loose bolts and nuts, weak reservoir, loose drain plugs and weak valves. Passengers observe that the causes of engine oil leakages from automobile engines are due to improper maintenance, faulty lubricating lines, cracks on crankcase, damaged fuel pump, loose drain pumps, damaged moving parts, over filling, damage seals, ramps, pot holes, loose sump, damage piston, damage cylinders, damage gaskets, dirty oil contaminants, looseness, damage tubes, improper tightings, aging tanks, weak reservoir and faulty engines. Drivers' information also indicates that leakages of engine oil from automobile engines are due to damage shaft, damage seals, damage pumps, looseness, faulty gauges, over filling of oil, aging engine and weak reservoir. The information gathered from drivers, the automobile mechanics and passengers indicate that effects of engine oil leakages from automobile engines are overheating of automobile engines, wear and tear of moving parts of these engines, environmental pollution, automobile engine failure, slippery roads, noisy engines, health hazards, engine oil wastage, dirt, belt drive destroy, poisoning, burning gaskets, incomplete combustion and inflammable engines.

CONCLUSION

Analysis of the information and deduction from the mechanics, passengers and drivers reveal that engine oil leakages are due to faulty seals, bolts, nuts, camshafts, sumps, gaskets, valves, engines, reservoir, gauges, gaskets and tubes. Further observations and analysis also reveals that the engine oil leakage causes serious environmental pollution, slippery roads and damage engines. These leakages are becoming rampant day in and out so this research is important so as to suggest possible ways of either reducing or stopping the problem.

RECOMMENDATIONS

There must be standardization of spare parts of automobiles so that fake spare parts are not use which worsen the problem of leakages. Maintenance activities of way side fitters must be regularize so that the quality of automobile mechanics services are assure for vehicles to always be in proper conditions. Automobile mechanics and engineers must be employed in the Ghana Police Service as many as possible to be checking all these leakages on the roads. Drivers and vehicle owners must be educated on the dangers associated with automobile engine oil leakages through the print and electronic media.

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