TECHNICAL REPORT ON THE STUDENTS' INDUSTRIAL WORK EXPERIWENCE SCHEME (SIWES)

HELD AT

WESLEY AUTO MECHATRONICS

Amule Mechanic village, Ayobo-ipaja road, ipaja lagos state.

BY

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ND/23/MEC/PT/0159

SUBMITTED TO:

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INSTITUTE OF TECHNOLOGY (IOT)

P.M.B. 1375 ILORIN, KWARA STATE.

IN PARTIAL FULFILMENT FOR THE AWARD OF NATIONAL DIPLOMA (ND) IN MECHANICAL ENGINEERING, KWARA STATE.

5TH AUGUST TO 5TH NOVEMBER, 2024

DEDICATION

I dedicate this to God for seeing me through; also to my lovely parent Mr & Mrs Ogunrinu for their support both morally and financially, May God reward you abundantly with long life and good health.

ACKNOWLEDGEMENT

Special appreciation goes to my parent Mr & Mrs Ogunrinu for their love and care. I applaud them for making me fall in love with education.

My gratitude is incomplete without acknowledging my maternal family for their support and contribution to my onward progress in life.

I also commend my supervisor, Mr. Wahab Aremu for his intellectual contribution and support during my S.I.W.E.S.

A big thank you to my colleagues from different intuitions that formed the group members during my training.

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CHAPTER ONE

1.0 INTRODUCTION TO SIWES

In 1974, the federal government of Nigeria introduced the National policy on industrial training called the student industrial work experience scheme (SIWES).

This program is under the umbrella of the ministry of education through the Industrial Training Fund (ITF), was design to help student acquire the necessary practical education experience in their fields of study and other related professions.

The program was established basically to impact elaborate practical understanding to student with respect to their various discipline. It is also intended that the student through a process of relation to academic knowledge and practical industrial application would understand the underlying principle and become better focused and acquire the practical application toward excellence in his/her discipline.

The student are expected to develop occupational competence that would facilitate their fitting into the world of work after graduation.

1.1 AIM AND OBJECTIVE OF SIWES

The student industrial work experience scheme (SIWES) has it major aims and objective of establishment. The following are the aim and objective of the program.

i. To provide student an opportunity to apply their theorical knowledge in really work situation, thereby bridging the gap between theory and practical.

ii. To expose student to working method and techniques in handing equipment and machineries that is not available in their various institutions.

iii. To make the transition from the institution to the world of work easier and thus enhance student contact for later job placement

iv. To prepare student in skill development by participating in field works, particularly in writing report in their fields of works.

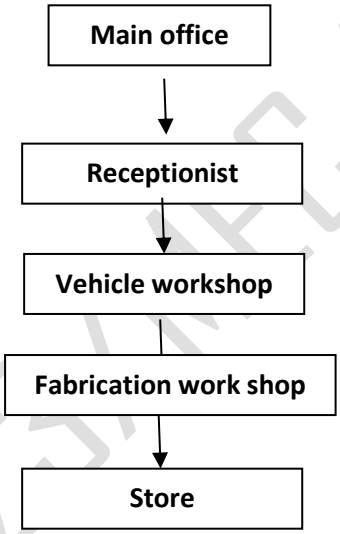
1.2 HISTORICAL BACKGROUND OF THE ORGANIZATION ATTACHMENT

At Wesley Automotive, we'll take great care of you and your car. Our office staff will make it easy and convenient for you. Most importantly, our mechanics will get the job done right.

With over 120 years of experience servicing cars across the Denver Metro area, we've seen everything. Our technicians will diagnose what's going on with your car and look into the root causes of your issue. Our staff will then give you recommendations while working with your individual needs.

Cars are complicated, but we do our best to make your decisions as clear and simple as possible. Rest easy knowing you've got over five decades of experience working under the hood of your vehicle.

1.3 ORGANIZATION CHAT OF THE ORGANIZATION



1.4 MAJOR ACTIVITIES OF THE ORGANIZATION

Success Automotive work engage in maintenance, servicing and preparing of a motor vehicles.

1.5 WORKSHOP SAFETY

Safety is the preventive measure timely taken to guide against any form of hazard injury or accident in our daily activities in the workshop. Workshop safety is particularly focusing on ways of preventing danger particularly accident, injury a times death to personnel or other things around the operator while doing work. The following are the basic work shop safeties that must be comply with these include:

I. Do not use the hand to stop the working machine

II. Do not play with any tools

III. Know where the emergency stop buttons are positioned in the workshop in case of accident.

IV. Always listen carefully to the supervisor and follow the instructions.

CHAPTER TWO

2.0 IDENTIFICATION OF TOOLS AND THEIR USES

The following are the basic workshop hand tools and equipment used in mechanical workshop:

1. **Long nose pliers**, also known as needle-nose pliers, are used for gripping, bending, and cutting small objects and wires. They are useful for reaching into tight spaces and working on electronics, jewelry, and mechanical repairs.

Uses

- **Grip small objects**: Long nose pliers are ideal for gripping small objects with precision.
- **Reach awkward places**: The long shape of long nose pliers allows them to reach into small areas where fingers or other tools can't reach.
- **Bend loops**: Long nose pliers can be used to bend loops in wires.
- **Attach wires**: Long nose pliers can be used to attach wires.
- **Cut wires**: Some long nose pliers have integrated cutters for cutting soft wires and other materials.

2. **A flat spanner** is a hand tool used to tighten or loosen nuts and bolts. It's a type of spanner, which is a tool that provides grip and mechanical advantage to turn objects.

How it works

- Flat spanners have two flat ends and are made of strong, durable material.
- They're used to turn rotary fasteners like nuts and bolts.
- The spanner applies torque to turn the object.

3. **A screwdriver's** function is to turn screws in order to tighten or loosen them. Screws are often used to fasten objects together.

How it works

- The head of a screwdriver fits into the shaped cavity and protrusion of a screw.
- Torque is applied in a clockwise or counter clockwise direction to turn the screw.

Types of screwdrivers

- **Flat head screwdriver**: Used to drive or remove screws with a flat head
- **Phillips head screwdriver**: Used to drive or remove screws with a Phillips head
- **Hex head screwdriver**: Used to drive or remove screws with a hex head
- **Torx head screwdriver**: Used to drive or remove screws with a Torx head
- **Offset screwdriver**: Used when a straight-shank screwdriver can't reach the screw

4. **A plug spanner** is a tool used to remove plugs from machines like motorcycles and generators. It can also be used on other machines that use similar plugs.

How it works

- Plug spanners are made of metal to avoid breaking.
- Some plug spanners are magnetic, which can help remove spark plugs from hard-to-reach places.
- The shape and handle of a plug spanner can help tighten the plug without deforming it.

5. **A cross wheel spanner**, also known as a cross wrench or tire iron, is used to loosen and tighten nuts and bolts on vehicle wheels. It's a key tool for automotive maintenance, such as changing tires and performing routine inspections.

How it works

- The cross design of the spanner provides extra turning leverage to make it easier to loosen or tighten the nuts

- The spanner's sockets come in different sizes to fit different lug nuts

Types of cross wheel spanners

- **Fixed length**: A single-piece tool that comes in different sizes
- **Telescopic**: Has an adjustable handle length to provide extra leverage
- **Multi-head**: Has multiple heads at either end or in a cross formation

6. **A battery analyzer** is a tool that tests the performance, health, and condition of a battery. It can be used to troubleshoot, maintain, and perform performance tests on batteries and battery banks.

How it works

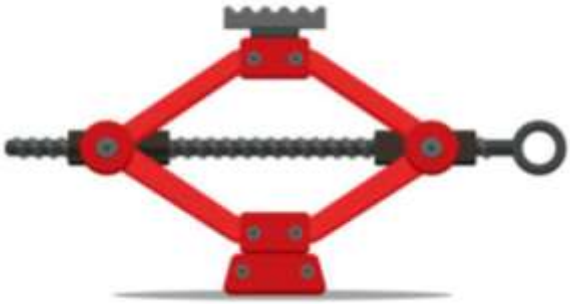
- A battery analyzer applies a load to the battery and monitors the voltage response
- It measures the battery's voltage, current, and resistance
- It can also calculate the battery's capacity, performance, and charge/discharge cycles

7. **A jack's** function is to lift heavy objects using mechanical or hydraulic power. Jacks are used in many industries, including construction, engineering, and vehicle repair.

How jacks work

- **Mechanical jacks**: Use a screw thread to lift heavy loads.

- **Hydraulic jacks**: Use hydraulic power to lift heavy loads. Hydraulic jacks use a pump to move oil into cylinders, which creates pressure that lifts the load.
  Types of jacks
- **Car jacks**: Used to lift vehicles for maintenance.
- **Floor jacks**: Also known as garage jacks, these are used to lift vehicles.
- **Toe jacks**: Compact jacks that can be used in tight spaces.



2.1 Engine Assembly

Assembly of engines requires cleanliness and attention to detail. Lab studies shown that it takes no more than two tablespoons dirt to spoil an engine. That is for grit ingested through the air filter, imagine how much less dirt. It takes to wear our a power plant when the dirt is built right in to the engine. Engine assembly must be done under clean condition. Besides cleaning the parts of the engine. The workshop area must be clean and the engineers must be clean dirty benches, tools, rags and hands all leaves grit in an engines. Whenever an engine under assembly is not being worked on it should be covered with plastic bag. This will keep out general.

2.2 LUBRICANTS, GASKET AND SEALER

Information provided about lubricant, gasket and sealers is often overworked. These items provided the various parts and components with the protection and sealing power they needed

LUBRICANTS

When assembling an engine lubricant must be applied to those component because when an engine first started it will suffer extreme damage if oil is not applied when assembling to an engine prevent Rust and corrosion from forming while the engine is in storage

GASKETS AND SEALERS

Gaskets and sealers fill the minute voids between parts keeping our dirt or sealig in liquid and gases

GASKETS

A gaskets is mainly used to sealed non-moving component together there are cylinder head gasket, crank case gasket and other. Gasket are made of Asbestos or metal, or thin sheets of soft metal, are generally used on today's head gasket while hole are cut out of each gasket to allow for the bolts, values, cylinder, and water passages in the head and block.

2.3 CRANKSHAFT

The crankshaft in conjunction with the connecting rod, convert the reciprocating motion of the piston to the rotary motion needed to drive the engine. It is usually made from carbon steel which is alloyed with a small proportion of Nickel.

2.4 FABRICATION SECTION

This section deals with joining of metals together by different method such as welding, grooving and forging.

There are various machine in the fabrication section this include:- Arc welding machine, guillotine machine, bench shears, bending machine and rolling machine.

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GRINDING MACHINE

BENCH SHEAR

ARC WELDING MACHINE

CHAPTER THREE

3.0 STUDENT SPECIFIC INVOLVEMENT

During my four month Student Industrial Work Experience Scheme **(SIWES)** at Success Automotive work, I was involved in maintenance and repairing of the following:

BUILDING AND SERVICING OF A TURBO CHARGER.

A damaged turbo charger is usually replaced with a new or rebuilt unit. Some turbo chargers can be rebuilt. If the compressor and turbine housings are not damage internally. Install a new or rebuilt turbo charger cartridge center housing rotating assembly (CHRA) this complete assembly includes the centre housing shaft. Wheel assembly and bearings.

To rebuild the charger, remove the engine obtain a new or rebuilt kits. The kit includes a shaft wheel assembly bearing and seals. Assemble the turbo charger on the engine. Before starting the engine after changing the oil and oil filter or their turbo service. Disconnect the ignition crank the engine until the engine oil light goes out.

SERVICE

Turbo charge requires maintenance to prevent early failure improper lubrication cause most. Turbo charger failures. The bearing must receive air adequate flow of clean lubricating oil. Damage of Turbo charger bearing result if the oil is during or the flow is stopped sand and other particles or objects striking the blades will damage the compressor and turbine wheels.

SERVICE MANUAL

Change the oil and oil filter whenever an engine bearing or the turbo charger is replaced. Clean the areas around the turbo charger before removal or disassembly cover all engine opening while the turbo charger is off.

COMPRESSOR Compressor is the work horse of the air conditioning system. Powered by a drive belt connected to the crankshaft of the engine. I had the opportunity to see the ring inside the compressor. A customer brought his scania motor to our workshop and we help him to service his compressor by loosening the pistons inside the compressor with spanners and l&k spanners. We washed the piston and crankshaft with petrol, diesel and brush and changed the rings inside the piston. When the aircon system is turned on, the compressor pumps refrigerant vapour under high pressure to the condenser. The compressor then draws in the low pressure refrigerant vapour to start another refrigeration cycle. The refrigeration cycle then runs continuously, and is regulated by the setting of the expansion valve.

MAINTENANCE OF BRAKE LINING

When the lining is worn out, the backing or rivets will contact the rotors or drums during braking, often causing damage requiring re-machining or replacement of the drums or rotors. In the automotive repair industry, many consumers purchase brake pads with lifetime warranty. These pads use a much harder lining than traditional brake pads and tend to cause excessive wear of the much more expensive rotors or drums. For that reason consumers should ensure that the new brake pads installed are those specified or supplied by the vehicles manufacturer.. Brake pads must always be replaced simultaneously on both ends of a vehicle axle, as the different lining thickness will cause uneven braking, making the vehicle pull in the direction of the more effective brake.

CLUTCH

Scania car clutches are any of various devices for engaging and disengaging two moving parts of a shaft, or of a shaft and a driving mechanism. While many things contain clutches of some sort, I will be focusing on the type that sit between the engine and the transmissions of an automobile equipped with a manual transmission.

CLUTH ASSEMBLY IN KITCHEN SINK DRAINER

The two moving parts in this case are the engine crankshaft and the transmission input shaft. The engine is the driving mechanism and the transmission is the driven mechanism. Since the engine rotates at varying speeds and manual transmissions have gears that must be shifted to transfer the engine's power to the wheels, the clutch has a crucial task when it comes to carefree motoring. Since the clutch is mostly hidden, it can be difficult to visualize how it works.

A clutch assembly consists of many small parts but there are four major component.

- **The Clutch Flywheel**: the clutch flywheel is connected directly to the engine crankshaft and, therefore, spins with the engine's motions

- **The Clutch Pressure Plate**: Bolted to the clutch flywheel is the second major component the clutch pressure plate. The spring-loaded pressure plate has two jobs: to hold the clutch assembly together and to release tension that allows the assembly to rotate freely
- **The Clutch Disc**: between the flywheel and the pressure plate is the clutch disc. The clutch disc has friction surfaces similar to a brake pad on both sides that make or break contact with the metal flywheel and pressure plate surfaces, allowing for smooth engagement and disengagement.
- **The Throw out Clutch Bearing and Release System**: these components work together simultaneously and are key to the engaging and disengaging process. They are the release or throw-out bearing, and the release system itself. The clutch release bearing is connected to one end of the hydraulic (or clutch fork mechanism) and rides on the diaphragm spring of the clutch. Depending on the type of release system, the throw-out bearing either pulls or pushes on the pressure plate diaphragm spring to engage or disengage the pressure plate's grip on the clutch disc when the clutch pedal is depressed and released

PISTONS AND CONNECTING ROD INSTALLATION

The shanks of the rods and piston assembly were lightly clamped in a vise in order to install Rings. Before installing the pistons we checked for the piston ring gap with a feeler gauge to see that it matches the space. We then started with lows ring on the piston and finished with the topmost ring. The lowest is the oil ring most rings are multi piece and can be assembled without tools care was taken in other not to scratch the piston with the ends. Rings were with an expander. This greatly reduced the chance of breaking a ring because of twisting or over expanding. It also saves the piston from scratching. The piston was put inside an oil then it was tapped with the hammer handle inside cylinder until the rod fully sat against the crankshaft. Tolerance was checked and the remaining piston and rods were assembled and they were taken through the same processes.

INJECTOR

Injector is integrated direct fuel injection system for diesel engines, combining the injector nozzle and the injection pump in a single component. The plunger pump used is usually driven by a shared camshaft. In a unit injector, the device is usually lubricated and cooled by the fuel itself.

DESIGN AND TECHNOLOGY

Design of the injector eliminates the need of high pressure fuel pipes, and with that their associated failures, as well as allowing for much higher injection pressure to occur. The injector is fitted into the engine cylinder head, where the fuel is supplied via integral ducts machined directly into the cylinder head. Each injector has its own pumping element, and in the case of electronic control, a fuel solenoid valve as well.

OPERATION PRINCIPLE

The basic operation can be described as a sequence of four separate phases: the filling phase, the spill phase, the injection phase, and the pressure reduction phase.

- Fill Phase: the constant stroke pump element on the way up draws fuel from the supply duct in to the chamber, and as long as electric solenoid valve remains de-energized fuel line is open.
- Spill Phase: the pump element is on the way down, and as long as solenoid valve remains de-energized the fuel line is open and fuel flows in through into the return duct.
- Injection Phase: the pump element is still on the way down. The solenoid is now energized and fuel line is now closed. The fuel cannot pass back into return duct, and is now compressed by the plunger until pressure exceeds specific opening pressure, and the injector nozzle needle lifts, allowing fuel to be injected into the combustion chamber.

- Pressure Reduction Phase: the plunger is still on its way down, the engine de-energizes the solenoid when required quantity of fuel is delivered, the fuel valve opens, fuel can flow back into return duct, causing pressure drop, which in turn causes the injector nozzle needle to shut, hence no more fuel is injected.

CHAPTER FOUR

4.0 EXPERIENCE GAINED

The experience gained at Success Automotive work, include learning about tools, safety, procedures, and how to repair vehicles.

TOOLS AND SAFETY

- **I** learning how to use basic tools and equipment like spanner, screw driver, battery analyser etc,
- I learning about safety protocols for working with vehicles

I also learn on how to perform basic operations e.g

- I learning how to remove and install parts
- I learning how to make precise adjustments to mechanical parts
- I learning how to troubleshoot and solve complex problems
- I learning how to repair different systems and components of a vehicle.

I also gain Soft skills developing communication skills, Developing active listening skills, developing problem-solving skills, Developing attention to detail, and Developing customer service skills.

CHAPTER FIVE

5.0 CONCLUSION

I found it interesting and I fully participated in it which in turn yields a successful result indeed it prepares me for future challenge in my chosen field. This SIWES program has turn out to be more interesting education due to the nature of the program itself.

5.1 RECOMMENDATION

The experience I gained during my SIWES program cannot be over emphasized I was practically oriented I humbly recommend that the SIWES program should be made compulsory for student of engineering, fields in order to gain more experience in their course of study.