TECHNICAL REPORT ON

STUDENT INDUSTRIAL WORK EXPERIENCE SCHEMES

(SIWES)

HELD AT

MACFA NIGERIA ENTERPRISE

OLUHUNSHOGO,UPPER GAA-AKANBI,ILORIN KWARA STATE

PRESENTED BY

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ND/22/MEC/FT/0031

SUBMITTED TO:

DEPARTMENT OF MECHANICAL ENGINEERING INSTITUTE OF TECHNOLOGY (IOT) KWARA STATE POLYTECHNIC, P.M.B 1375 ILORIN KWARA STATE

IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF NATIONAL DIPLOMA (ND) IN MECHANICAL ENGINEERING DEPARTMENT KWARA STATE, POLYTECHNIC ILORIN, NIGERIA.

05 AUGUST - 05 DECEMBER 2024

CERTIFICATION

This is to certify that I SOLIU RAFIU OLUSHOLA with matriculation number ND/23/MEC/FT/0031 compiled this report based on my four months Student Industrial Work Experience Scheme at MACFA NIGERIA ENTERPRISE Mechanic Workshop from August, 2024 to December, 2024.…….. ……Student's Name

Student's Signature ……. ……School based supervisor

Supervisor's Signature

DEDICATION

To my Dearest Parents, with boundless gratitude and immeasurable love. thought the journey of my SIWES experience, your unwavering support has been my guiding light. Your encouragement, sacrifices, and ceaseless belief in my aspirations have been the driving force behind every stride I've taken

Your steadfast encouragement, imparted wisdom, and endless motivation have been instrumental in navigating the challenges and triumphs of this experience. Your unwavering faith in my abilities has fortified my determination to excel and to pursue excellence in every endeavor

I dedicate this SIWES report to you, my pillars of strength. Your tireless efforts in shaping me into the person I am today have been the cornerstone of my success. Your teachings and values have been my compass, guiding me through the maze of professional growth and personal development.

I am profoundly grateful for your unyielding love and support, which have paved the way for my accomplishments. Your belief in me has instilled the confidence to face challenges and chase dreams.

ACKNOWLEDGEMENT

This SIWES work has been a great journey for me and has helped me to understand an area of work that is vast and wonderful. It has been completed with months of hard work and dedication and would not have been possible if not for the blessing and guidance l have received from a number of people. For

this I am particularly indebted to all staffs of Mechanical Engineering Department of Kwara Poly who had earlier thought me all the basics involved with automobile engineering.

ABSTRACT

The Student industrial Work Experience Scheme established by the Federal Government of Nigeria was aimed at exposing students of higher institutions to acquire industrial skill and practical experience in their approved courses of study and also to prepare the students for the industrial work situation which they are likely to meet after graduation. This technical report is based on the experiences gained during

my four month of industrial training at Rasad technical works. This report highlights how tools are being used to repair various vehicles, identification of different vehicles part and maintenance of vehicle. I was opportune to work at the Auto mobile workshop. These sections have exposed on how to repair and maintain the engines of vehicles and how to change the oil of a car and more. This report describes the activities and my experience gained during the period of the training. Also, it stated the problems encountered and give suggestions for improvement of the scheme.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 History and background of SIWES scheme

The Structured Industrial Work Experience (SIWES) is a Skill training program designed to expose and prepare student of Universities, Polytechnics, Colleges of Technology. Colleges of Agriculture and College of Education for the Industrial Work experience they are likely to meet after graduation. The scheme also afford student the opportunity of familiarizing and exposing themselves to the needed experience in handling equipment and machinery that are usually not available in their institute. Before the establishment of the scheme, there was a growing concern among industrialist that graduated of tertiary institution lacked adequate practical background (studies) preparatory for employment in industries. Thus, the employer were of the opinion that the theoretical education going on in institutions of higher learning was not responsive to their needs. It is against this background that the rotation for initiating and designing the scheme by the Fund during its formative year- 1973/74 was introduced to acquaint student with the skill of handling employers equipment and machinery. The ITF solely funded the scheme during its formative years. But as the financial involvement become unbearable to Fund, it withdrew from the Scheme in 1978. The Federal Government handed over the scheme in 1979 to both the National Universities Commission (NUC) and the National Board for Technical Education (NBTE). Later, the Federal Government in November 1984 reverted the management and implementation of the SIWESS programme to ITF and effectively taken over by industrial Training Fund in July 1985 with the funding being solely borne by the Federal Government.

SIWES is a tripartite programme involving the student, the Polytechnic and the industries (employer of labour). The programme is funded by the Federal Government of Nigeria and jointly coordinated by Industrial Training Fund (ITF) and National Board for Technical Education (NBTE).

1.2 Objectives of the Structured Industrial Work Experience (SIWES)

The Industrial Training Fund's policy Document No. 1 of 1973 which established SIWESS outlined the objectives of the scheme. The objectives are to:

Provides an avenue for students in institutions of higher learning to acquire industrial skil and experience during their course of study.

It exposes Students to work methods and techniques in handling equipment machinery that may not be available in their institutions.

It makes the transition from school to the world of work easier and enhance students' contact for later job placements and a chance to evaluate companies for which they might wish to work.

It provides students with the opportunities to apply their educational knowledge in real work and industrial situations, there by bridging the gap between theory and practice.

The programme teaches the students on how to interact effectively with other workers and supervisors under various conditions in the organization

1.3 Aim of the Structured Industrial Work Experience (SIWES)

The primary goal of Structured Industrial Work Experience (SIWES) is to bridge the gap between theoretical knowledge gained in classrooms and real-world application within professional settings. This program aims to provide hands-on experience, allowing participants to develop industry-specific skills, understand workplace dynamics, and establish connections with industry professionals. Ultimately, SIWES prepares individuals for their future careers by offering practical insights and a deeper understanding of the demands and practices within their chosen field.

CHAPTER TWO

2.1 Historical Context of MACFA NIGERIA ENTERPRISE

Amidst the industrial revolution's roar, the inception of MACFA NIGERIA ENTERPRISE in Year 2017 marked a pivotal moment in the automotive landscape. Nestled within Old jebba road opposite amala

too sure spot,agbede poly gate Ilorin, Kwara state, this workshop emerged during an era of burgeoning automobile innovation and societal transformation.

At its genesis, MACFA NIGERIA ENTERPRISE mirrored the nascent automotive industry's spirit, catering to a burgeoning demand for vehicular maintenance and repair. As horse-drawn carriages faded into memory, the workshop embraced the burgeoning era of automobiles, offering services that evolved alongside technological advancements. a

Through wars, economic upheavals, and technological leaps. MACFA NIGERIA ENTERPRISE weathered the tides of time. It witnessed the transition from rudimentary mechanical systems to the advent of complex engines and digital diagnostics.

Throughout its journey, MACFA NIGERIA ENTERPRISE remained a cornerstone of reliability, its seasoned craftsmen and technicians adapting their expertise to meet the ever-evolving needs of modern vehicles. The workshop not only serviced cars but also became a repository of automotive history, preserving the legacy of bygone vehicles while embracing the cutting-edge technologies of today. MACFA NIGERIA ENTERPRISE story intertwines with the tapestry of automotive evolution-a saga of wrenches. grease, and relentless dedication. Its journey from the humble beginnings of a mechanic workshop to a bastion of automotive expertise symbolizes the enduring spirit of innovation and adaptability in the realm of automobile servicing.

2.2 Objectives of MACFA NIGERIA ENTERPRISE

Exception service Quality: MACFA NIGERIA ENTERPRISE aims to deliver top-notch automotive services, ensuring that every customer receives reliable and high-quality repairs and maintenance

Customer satisfaction: The workshop prioritizes customer happiness by providing a welcoming environment, transparent communication, and personalized attention to meet individual needs

Technical Expertise:MACFA NIGERIA ENTERPRISE strives to maintain a team of skilled technicians and mechanics who stay updated with the latest engineering technologies and repair techniques.

Timely and Efficient service: The objective is to minimize vehicle downtime by efficiently diagnosing issues and executing repairs or maintenance promptly. From routine maintenance to complex repairs.

Comprehensive engineering solutions: MACFA NIGERIA ENTERPRISE aims to offer a wide range of services. catering to diverse models and addressing various engineering needs.

Ethical Practices: Upholding honesty and integrity, the workshop commits to fair pricing. transparent assessments, and recommendations that prioritize customers' best interests.

Continuous improvement: MACFA NIGERIA ENTERPRISE seeks ongoing refinement by embracing technological advancements, implementing feedback mechanisms, and adapting to industry changes to enhance service quality continually.

Community Engagement: Beyond servicing generator, the workshop aims to foster relationships within the community, participating in local initiatives and contributing positively to the neighborhood.

Environmentally Conscious Practices: MACFA NIGERIA ENTERPRISE is committed to adopting eco-friendly practices, where possible, by responsibly disposing of waste materials and promoting sustainable solutions in the automotive industry.

2.4 Organizational Chart of the Company

CEO

WORKSHOP

MANAGER

FOREMAN (MECHANICAL)

FOREMAN (ELECTRICAL)

2.5 Departments within MACFA NIGERIA ENTERPRISE

These are the departments in MACFA NIGERIA ENTERPRISE Garage

1. Mechanical Department

2. Electrical Department

CHAPTER THREE

3.1 GENERAL INTRODUCTION TO MACFA NIGERIA ENTERPRISE SERVICE

Welcome to MACFA NIGERIA ENTERPRISE , where power plant (generator) expertise meets dedicated service,situated at OLUHUNSHOGO,UPPER GAA-AKANBI,ILORIN KWARA STATE. The workshop stands as a reliable hub for resolving a spectrum of power plant (generator) issues. With a team of proficient and experienced mechanics, we take pride in offering comprehensive solutions for power plant maintenance, repairs, and diagnostics.

At MACFA NIGERIA ENTERPRISE, our commitment is clear ensuring power plant (generator) receive meticulous attention and expert care . From checkups to intricate repairs and diagnostics,our skilled mechanics handle a diverse range of car issues. Our workshop is equipped to address not just the basic fixes but also the more complex technical challenges, allowing us to provide a God fearing service to our clients.

Our primary goal is to keep generator operating smoothly and safely. We understand the importance of reliable transportation and strive to ensure every car that enters our workshop leaves in optimal condition. Quality and precision are at the core of our work

ethic, and we take great pride in delivering top notch service to every vehicle that comes through our doors.

Beyond our technical expertise, what truly sets us apart is our dedication to customer satisfaction. We prioritize clear communication and transparency , ensuring our clients are informed every step of the way. We take the time to explain the necessary repairs or maintenance required enabling our customers to make informed decisions about their generator.

3.2 SAFETY PRECAUTIONS, RULES, AND REGULATIONS.

1. **Personal Protection Equipment (PPE): All employees and visitors are required to wear appropriate PPE, such as safety glasses , gloves, and protective clothing when working in the designated areas**

2. **Tool Handling and Usage: Proper handling and usage of tools and equipment are mandatory. Employees must be trained in using tools safely and report any damaged or faulty equipment immediately**

3. **Workplace Cleanliness: Maintaining a clean and organised workspace is essential. Regular cleanups and disposal of water materials must be adhered to promoting a safe working environment.**

4. **Fire Safety Measure: Fire extinguishers, smoke detectors, and emergency exits should be easily accessible and regularly checked. Employees must undergo fire safety training and participate in fire drills.**

5. **Chemical Handling and Storage: Proper storage, handling, and disposal of chemicals and hazardous materials must strictly follow safety protocols. Material Safety Data Sheets (MSDS) should be available and accessible.**

6. **Vehicle Maintenance Safety: Safety protocols must be followed during vehicle repairs and maintenance. Proper lifting procedures, vehicle securing, and use of safety stand should be adhered to at all times.**

7. **Training and Education: All employees must undergo safety training program regularly to stay updated on safety procedures and regulations**

8. **Reporting of Hazards: Employees are encouraged to report any potential hazards or safety concerns immediately to management for swift resolution.**

9. **Compliance with Regulations: Compliance with all relevant safety regulations and standards set by local authorities and regulatory bodies is mandatory**

10. Emergency Response: Employees should be aware of emergency procedures including first aid, and be prepared to respond appropriately in case of an accident or emergency

3.3 Training and learning opportunities at MACFA NIGERIA ENTERPRISE

During my Structured Industrial Work Experience (SIWES) at MACFA NIGERIA ENTERPRISE, I had the opportunity to engage in various training and learning initiatives aimed at expanding im knowledge and skill set in automotive maintenance and repair

1. Technical Workshops: MACFA NIGERIA ENTERPRISE regularly conducted technical workshops focusing on advanced vehicle diagnostics, engine tuning, and the integration of new automotive technologies. These workshops allowed me to gain insights into the latest industry trends and techniques employed in modern vehicle servicing

2. Mentorship Program: The workshop offered a mentorship program where experienced mechanics provided guidance on intricate repair techniques and troubleshooting methodologies. This mentorship allowed me to enhance my problem solving abilities and improve my understanding of complex mechanical issues.

3. Practical Skill Development: The hands-on nature of the SIWES provided an ideal environment for practical skill development .Under the guidance of seasoned professionals, I refined my abilities in tasks such as engine overhaul, brake system maintenance and electrical system diagnostics.

4. Safety Training: MACFA NIGERIA ENTERPRISE prioritizes safety in the workplace participated in safety training sessions that covered proper handling of tools and equipment, hazard identification, and adherence to safety protocols. This training instilled a strong sense of safety awareness and compliance within the workshop.

5. Customer service Enhancement: Additionally, I received training in customer service practices specific to the automotive industry. This training emphasized effective communication with clients, understanding their needs, and delivering exceptional service, enriching my client-engagement skills.

Overall, the training and learning opportunities provided by MACFA NIGERIA ENTERPRISE significantly contributed to my professional growth, equipping me with a comprehensive skill set and a deeper understanding of automotive maintenance and repair

3.4 Equipment Utilization at MACFA NIGERIA ENTERPRISE **Service**

SAFETY EQUIPMENTS:

- Engineering overall

- Industrial steel toe safety boot

- Cotton and rubber hand glove

- Safety goggle

- Face masks and nose masks

- Fire extinguisher

HAND TOOL

- Wrencher (adjustable,socket. torque)

- Screwdrivers

- Hammers

- Piler

- Sets of Spanners

CHAPTER FOUR

4.0 REPAIR AND MAINTENANCE PROCESS

Mechanical systems in automobiles are a little complex and some problems, may need to be serviced at the repaired shop.

4.1 SAFETY INFORMATION

Most accidents in servicing/mechanical repair involve slips. trips and falls or poor mande handling. Other causes of incidents sometimes resulting in serious injury or death include working under inadequately supported vehicles. incidents involving petrol and vehicle movement. Keeping work areas free of clutter is an important, but often overlooked, step in running a safe and productive workshop. Requiring appropriate protective gear minimizes eye and finger lacerations, which are common auto body shop injuries. Shops should purchase appropriate eyewear, and make protective gloves available to prevent cuts from glass, sheet metal or the other jagged object.

See Figure 1. Common tools

4.2 Cooling System

• Role: To regulate the temperature of the engine and other generator components, preventing overheating and ensuring efficient operation. Excess heat can cause damage, reduce performance, and even lead to catastrophic failures.

• Types:

  • Radiator and Fan (Liquid-Cooled):

    * Similar to a car's system, using a liquid coolant (usually a mix of water and antifreeze) circulated by a pump through the engine block and a radiator to dissipate heat. A fan blows air through the radiator to aid cooling.

  • Air-Cooled:

    * Uses fins on the engine cylinders and a fan to direct airflow around the engine and transfer heat to the surrounding air. Common in smaller, portable generators due to their simplicity.

• Key Components:

  • Radiator: Transfers heat from the coolant to the air.

  • Coolant Pump: Circulates the coolant through the engine and radiator.

  • Thermostat: Regulates coolant temperature.

  • Fan: Provides airflow for cooling.

  • Hoses: Connect the components and allow coolant circulation.

  • Coolant: Liquid medium for heat transfer.

• Maintenance:

  • Regularly check coolant level and quality.

  • Flush and replace coolant at recommended intervals.

  • Inspect hoses for cracks, leaks, and wear.

  • Check radiator for leaks and debris build-up.

  • Inspect fan blades for damage and proper operation.

  • Check for any signs of overheating and address them promptly.

See Figure 2. Cooling System

4.3 Lubrication System

• Role: To reduce friction between moving parts within the engine, preventing wear, damage, and overheating. Proper lubrication is vital for engine longevity and performance.

• Key Components:

  • Oil Pan: Reservoir for engine oil.

  • Oil Pump: Circulates oil through the engine.

  • Oil Filter: Removes impurities from the oil.

  • Oil Passages: Channels through which oil flows to lubricate the engine.

  • Oil Cooler (sometimes present): Helps regulate oil temperature.

• Maintenance:

  • Regularly change oil and oil filter as per manufacturer's recommendations.

  • Check oil level frequently.

  • Inspect for oil leaks.

  • Monitor oil pressure and temperature during operation.

  • Use the correct type of oil recommended for the generator.

See Figure 3. Lubrication System

4.4 Fuel System

• Role: To store, filter, and deliver fuel to the engine in a controlled manner, ensuring proper combustion and generator operation.

• Key Components:

  • Fuel Tank: Stores the fuel.

  • Fuel Pump: Transfers fuel from the tank to the engine.

  • Fuel Filter: Removes impurities from the fuel.

  • Fuel Lines: Transport fuel.

  • Carburetor (Older Gasoline Engines): Mixes fuel and air for combustion.

- Fuel Injectors (Newer Gasoline/Diesel): Inject precise amounts of fuel into the cylinders.

- Maintenance:
  - Regularly check fuel levels.
  - Replace fuel filter as recommended.
  - Inspect fuel lines for leaks or damage.
  - Clean or overhaul carburetor as needed (if applicable).
  - Ensure fuel injectors are functioning properly.
  - Use the recommended fuel type for the generator.

See Figure 4. Fuel System

4.5 Exhaust System

- Role: To safely direct exhaust gases away from the engine and to reduce noise generated by the engine during combustion.

- Key Components:
  - Exhaust Manifold: Collects exhaust gases from the engine cylinders.
  - Muffler: Reduces noise from the engine.
  - Exhaust Pipe: Directs exhaust gases away from the generator.

- Maintenance:
  - Inspect for rust, leaks, and damage to all components.
  - Replace muffler if damaged or ineffective.
  - Ensure the system is properly secured and well-supported.

- Ensure proper venting to prevent carbon monoxide build-up.

See Figure 5. Exhaust System

4.6 Control Panel

- Role: To provide a user interface for starting, monitoring, and controlling generator operation, and for ensuring operator safety and proper use.

- Key Components:

- Start/Stop Switch: Initiates and terminates generator operation.
- Circuit Breakers/Fuses: Protect electrical circuits from overloads.
- Voltage Meter: Displays output voltage.
- Frequency Meter: Displays output frequency.
- Ammeter: Displays output current.
- Hour Meter: Tracks the running time of the generator.
- Engine Protection Sensors: Monitor oil pressure, temperature, and other critical parameters, and shut the generator down if problems are detected.
- Automatic Transfer Switch (ATS): Detects loss of grid power and automatically starts the generator and switches to it as a power source.

- Maintenance:
  - Regularly check the functionality of all gauges and meters.
  - Ensure the circuit breakers/fuses are in good working condition.
  - Inspect and clean all terminals and connections.
  - Verify that all safety systems are functioning properly.
  - Calibrate sensors as required to ensure accurate readings

4.7 Battery and Charging System

- Role: To provide electrical power for starting the generator's engine.
- Key Components:
  - Battery: Stores electrical energy for starting.
  - Charging Circuit: Charges the battery while the generator is running.
  - Trickle Charger (Optional): Maintains battery charge during long periods of inactivity.
- Maintenance:
  - Check battery terminals for corrosion and clean as needed.
  - Test battery condition regularly.

- Ensure proper charging circuit function.
- Replace the battery when necessary to avoid issues with starting.

Figure 7. Battery and Charging System

4.8. Frame and Housing

• Role: To provide structural support for all generator components and to protect them from external elements and accidental damage.

• Materials: Often made of steel or aluminum, depending on size and application.

• Maintenance:

- Inspect the frame for any signs of rust or damage.
- Ensure all mounting points are secure.
- Inspect housing for any damage or cracks that could expose the internal components.
- Maintain any ventilation openings to prevent overheating

Figure 8. Frame and Housing

4.9 Base and Mounting

• Role: To provide a stable and secure platform for the generator, minimizing vibrations, reducing noise, and ensuring safe operation.

• Types:

- Stationary Mounts: Concrete pads or other fixed structures for permanent generators.
- Wheels or Handles: For portable generators.

• Maintenance:

- Ensure the base is level and stable.
- Check for any damage or looseness of mounting bolts.
- Inspect wheels or handles for proper function (for portable generators).

Figure 9. Base and Mounting

4.10 Coupling

• Role: To connect the output shaft of the engine to the rotor of the alternator, transferring mechanical power from the engine to the alternator.

• Types:

  • Rigid Coupling: Transmits torque without any flexibility.

  • Flexible Coupling: Allows for minor misalignment between the engine and alternator shafts and cushions vibrations.

• Maintenance:

  • Inspect for wear, damage, or looseness.

  • Ensure proper alignment.

  • Lubricate moving parts as per manufacturer's recommendations.

Figure 10. Coupling

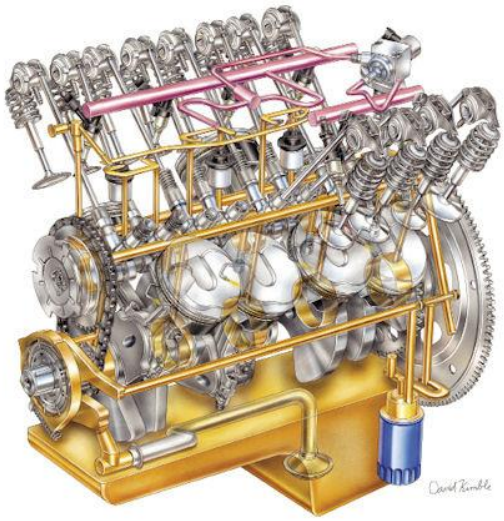
CHAPTER FIVE

5.0 Appendices

Figure 1. Common to

Figure 2. Cooling System

Figure 3. Lubrication System



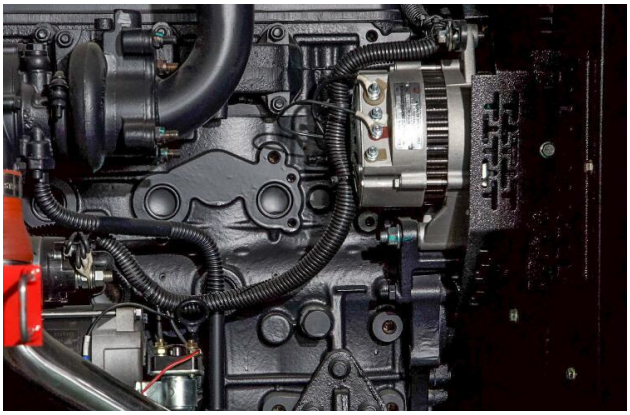


Figure 4. Fuel System

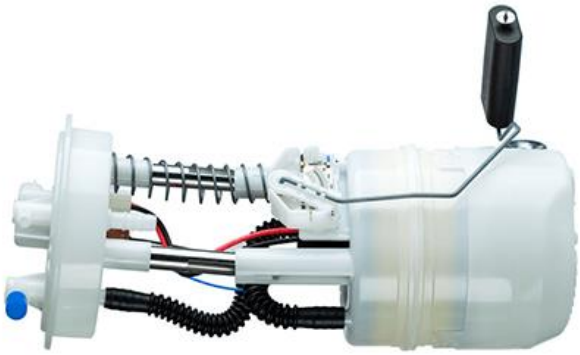


Figure 5. Exhaust System

Figure 6. Control Panel

Figure 7. Battery and Charging System

Figure 8. Frame and Housing

Figure 9. Base and Mounting

Figure 10. Coupling

5.1 CONCLUSION

The issue of SIWES in the various institutions should be compulsory to all under graduate student to have practical experience of what has been taught. It also enables be friendlier with an organization of the course of study.

My impression about the organization is that the company I fell happy with. Because of the way the director of the company treated me, just as if I should work there after my diploma course.

My industrial attachment as a junior technician was a huge success and a great time of acquisition of knowledge and skills. Through my training I was able to appreciate my chosen course of study even more, because I had the opportunity to blend the theoretical knowledge acquired from school with the practical handsome application of knowledge gained here to perform very important tasks that contributed in a way to my productivity in the company M training here has given me a broader view to

the importance and relevance of Mechanical Technician in the immediate society and the world as a whole, as I now look forward to impacting it positively after graduation. I have also been able to improve my communication and presentation skills and thereby developed good relationship with my fellow colleagues at work. have also been able to appreciate the connection between my course of study and other disciplines in producing a successful result.

5.2 SUGGESTION TO THE ORGANIZATION AND THE POLYTECHNIC CONCERNING THE SIWES PROGRAMME.

The deal of giving opportunity to do SIWES programme is a good idea because it aid the student to know practical aspect of the field of study.

Any organization likes is where he/she goes for the program me that he she may be kindly employed, if it is relevant to the course of his/her study.

5.3 RECOMMENDATION

I use this means to make the following recommendations concerning the training of students in Industrial Attachments. I would like to recommend that allowances should be paid to students during their programme just like NYSC and not after. This would help them a great deal t handle some financial problems during their training course.

5.4 CHALLENGES ENCOUNTERED DURING PERIOD OF TRAINING

I wasn't allowed to drive cars after repair. So I could not do active test using Diagnostic And I was not allow to go out to repair car. I was restricted to the machines on my own in the workshop.

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