A TECHNICAL REPORT

ON

STUDENT INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES)

UNDERTAKEN AT

NIGERIAN INSTITUTE FOR OIL PALM RESEARCH

(NIFOR), BENIN CITY

BY

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PREFACE

This technical report covers experience acquired during the period of four (4) months of student training work experience scheme (SIWES) held at NIGERIAN INSTITUTE FOR OIL PALM RESEARCH (NIFOR), BENIN CITY which is an essential part of preparing the student for their diploma in engineering course to satisfy the accredited requirement.

DEDICATION

The report is whole heatedly dedicated to Almighty which has made these four months of the siwes appreciate the fatherly kindness of my industrial father, brothers, sister,Engr.olaitan,Engr Abu,Dr afeez whom had contributed through thick and thin to the upliftment of my career.

O Allah, graciously have mercy upon my parents for all they have done for me from my childhood to where I am today

ACKNOWLEDGEMENT

Firstly, my profound gratitude goes to Almighty Allah the owner of the whole universe, the sustainers of the world who gave me the privilege and knowledge to witness in the industrial training exercise, and to my able parents Mr. & Mrs. Olaitan for their full financial and parental support on my life before, during and after the SIWES program. Also to my uncle Engr. Wakilu OLAITAN Ayeola and his wife OLAITAN Salamat Adams for their moral & spiritual support towards my life.

Finally, I bless the almighty for my other course mates whom also went for the said program,may we never lack. Amen

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CHAPTER ONE

1.0 INTRODUCTION

The student industrial work experience scheme (SIWES) is organized by the Industrial training fund (ITF) whose primary aim is to expose students to the practical areas of experience of his/her course of study. This programme is made mandatory to especially students of science and technology courses to fulfill the requirements in his/her academic pursuit, and by so doing full participation of student is been accessed.

1.1 SIWES

The student industrial work experience scheme was promulgated through decree 140 of 1973 by the Federal government under the head of state Gen. Yakubu Gowon. It was introduced to give the Bsc and National Diploma (ND) students the work experience needed during their studies.

1.2 AIMS AND OBJECTIVES OF SIWES

i. Acquisition of industrial skills.

ii. Its aim to prepare students for the working situation ahead.

iii. Its aim is also to expose student to the method and techniques in handling available equipment in their various institutions.

iv. It gives students technological know-how on their course(s).

1.3 HISTORICAL BACKGROUND OF THE COMPANY

The Nigerian Institute for Oil Palm Research (NIFOR) was established in 1939 as the West African Institute for Oil Palm Research (WAIFOR) in Benin City, Nigeria. Its creation was part of a regional effort to improve agricultural

production and sustainability in West Africa. The institute was initially set up to conduct research and provide solutions for the challenges facing oil palm production, a critical agricultural sector in the region.

In 1964, following Nigeria's independence, the organization was renamed the Nigerian Institute for Oil Palm Research (NIFOR) and placed under the Federal Ministry of Agriculture. Its mandate expanded to include research on other tree crops like coconut, date palm, raffia palm, and shea butter tree. This diversification reflected the growing importance of these crops in Nigeria's economy and their potential to boost agricultural development.

NIFOR has played a pivotal role in developing high-yielding and disease-resistant varieties of oil palm and other tree crops, significantly contributing to the agricultural sector. The institute has also developed modern agricultural practices and technologies to enhance the efficiency and productivity.

1.4 PLACE OF ATTACHMENT

The field of attachment is automobile where we only deal with gasoline engines. Brief history about Nigerian Institute for Oil Palm Research (NIFOR), Benin City.

CHAPTER TWO

2.0 INTRODUCTION TO WORKSHOP EQUIPMENT

At NIFOR, various machines and tools are used in processing and maintenance activities. These include:

2.1 SAFETY MEASURES

- Wearing personal protective equipment (PPE).
- Following standard operating procedures (SOPs).
- Ensuring proper handling and maintenance of tools.

2.2 CAUSES OF ACCIDENTS IN A MECHANICAL WORKSHOP

- Ignorance of safety procedures.
- Carelessness in handling tools and machines.
- Lack of proper training and supervision.

2.3 MACHINES AND TOOLS USED AT NIFOR

- **Lathe Machines**

A lathe machine is used for shaping metal or wood by rotating the workpiece against a cutting tool. It is commonly used for operations such as turning, facing, threading, and drilling.

- **Drilling Machines**

A drilling machine is used to create holes in metal, wood, or other materials. It consists of a rotating drill bit that cuts into the workpiece, and it can be either manually operated or automated.

- **Welding Machines (Arc and Gas Welding)**

Arc Welding Machine: Uses an electric arc to generate high heat for melting and fusing metals together. It requires an electrode and a power source.

Gas Welding Machine: Uses fuel gases (like acetylene) and oxygen to produce a flame that melts and joins metal pieces.

- **Generators and Power Supply Units**

Generators convert mechanical energy into electrical energy to provide backup power. They are essential in industrial settings to ensure continuous operation during power outages.

Oil Palm Processing Machines

These machines are used in extracting and refining palm oil. They include sterilizers, digesters, screw presses, and clarifiers, which help in crushing, separating, and purifying the oil from palm fruit.

2.4 MAINTENANCE AND REPAIR OF EQUIPMENT

Regular maintenance is carried out to ensure the smooth operation of machines and tools. Routine servicing, part replacements, and troubleshooting are key aspects of equipment maintenance.

CHAPTER THREE

3.0 SOME MACHINES AT NIFOR AND HOW TO OPERATE THEM

3.1 OIL PALM PROCESSING MACHINES

NIFOR has developed Small Scale Processing Equipment (SSPE) to enhance palm oil extraction efficiency. The general process includes:

- **Sterilization:** Fresh fruit bunches (FFB) are steamed to deactivate enzymes that increase free fatty acid content and to loosen the fruits.
- **Threshing:** The sterilized bunches are threshed to separate the fruits from the bunch stalks.
- **Digestion:** The fruits are pounded to break the oil-bearing cells.
- **Pressing:** The digested mash is pressed to extract crude palm oil.
- **Clarification:** The extracted oil is clarified to remove water and non-oily solids.
- **Oil Drying:** The clarified oil is dried to reduce moisture content.

NIFOR offers different capacities of SSPE to cater to various scales of operation.

3.2 LATHE MACHINE

Operating a manual lathe involves:

- **Preparation:**
  - Press the emergency stop (E-stop) button.
  - Clean and clear the lathe of any debris.
- **Setup:**
  - Secure the work piece in the chuck.
  - Select and install the appropriate cutting tool.
- **Operation:**
  - Calculate the required spindle speed (RPM) based on the material and cutting tool.
  - Rotate the chuck manually to ensure there are no collisions.
  - Set the spindle speed to a low setting initially.

- Engage the spindle in the forward direction.
- Start the lathe and adjust to the calculated RPM.
- Position the cutting tool at the starting point and gently engage it with the workpiece.
- Perform the cutting operation, adjusting feeds and speeds as necessary.

- **Completion:**
  - Stop the spindle.
  - Press the E-stop button.
  - Remove the workpiece.
  - Clean the lathe and surrounding area using brushes and a vacuum; avoid using compressed air.

These steps ensure safe and efficient lathe operation.

2.3 WELDING MACHINES

While specific procedures for welding machines at NIFOR are not detailed in the provided sources, general steps include:

- **Preparation:**
  - Ensure the welding area is clean and free from flammable materials.
  - Wear appropriate personal protective equipment (PPE), including welding helmet, gloves, and protective clothing.
- **Setup:**
  - Select the appropriate welding machine and settings for the material and welding process.
  - Prepare the workpieces by cleaning and positioning them as required.
- **Operation:**
  - Strike the arc and perform the welding operation, maintaining proper technique and monitoring the weld pool.
  - Adjust settings as necessary to achieve the desired weld quality.
- **Completion:**
  - Inspect the weld for defects.
  - Clean the welded area if necessary.
  - Turn off and properly store the welding equipment.

GENERATORS AND POWER SUPPLY SYSTEMS

General steps for operating generators include:

- **Preparation:**
  - Check fuel and oil levels; refill if necessary.
  - Inspect the generator for any visible damage or leaks.

- **Startup:**
  - Ensure all loads are disconnected.
  - Start the generator according to the manufacturer's instructions.
  - Allow the generator to warm up.
- **Operation:**
  - Connect the loads gradually.
  - Monitor the generator's performance, including voltage and frequency.
- **Shutdown:**
  - Disconnect all loads.
  - Allow the generator to run without load for a few minutes to cool down.
  - Shut down the generator following the manufacturer's procedures.

3.5 PUMPS AND IRRIGATION SYSTEMS

Installing and operating an irrigation system involves:

- **Planning:**
  - Design the system layout, considering water source, coverage area, and plant water requirements.
- **Installation:**
  - Trench the areas where pipes will be laid.
  - Lay the main and lateral lines.
  - Install valves, sprinklers, and other components.
- **Connection:**

- Connect the system to the water source, ensuring proper backflow prevention.

- **Testing:**
  - Pressurize the system to check for leaks.
  - Adjust sprinkler heads for proper coverage.

- **Operation:**
  - Set the controller for appropriate watering schedules.
  - Regularly inspect and maintain the system to ensure optimal performance.

CHAPTER FOUR

4.0 INTRODUCTION

During my SIWES training, I gained hands-on experience in machine maintenance, welding, power system operations, and equipment troubleshooting.

4.1 PRACTICAL ACTIVITIES AND TASKS UNDERTAKEN

- **Routine Maintenance of Oil Palm Processing Machines.**

  I was actively involved in the routine maintenance of oil palm processing machines, ensuring their efficient operation. My tasks included performing regular checks and servicing equipment such as sterilizers, digesters, screw presses, and clarifiers.

- **Welding and Fabrication Work**

  During my experience, I worked with an signed supervisor to work on welding and fabrication, which involved joining metal parts using arc and gas welding techniques. I also engaged in cutting, bending, and assembling metal structures to repair or construct mechanical components used in industrial operations.

- **Generator Servicing and Troubleshooting**

  I participated in the servicing and troubleshooting of generators to ensure their optimal performance. My responsibilities included inspecting, cleaning, and replacing faulty parts such as filters, spark plugs, and lubricants. I also diagnosed and resolved issues related to fuel system failures, battery malfunctions, and electrical faults, ensuring uninterrupted power supply for operations.

- **Operation of Irrigation Systems**

  I was involved in managing irrigation systems to support agricultural activities. My duties included monitoring water pumps, adjusting flow rates, and ensuring the proper functioning of pipes and sprinklers. This was essential for maintaining an efficient water supply to crops, preventing water wastage, and optimizing agricultural productivity.

4.3 CHALLENGES FACED

Difficulty in Handling Complex Equipment

As SIWES student I was faced with challenges operating complex machines due to a lack of prior hands-on experience. Without proper training, handling sophisticated equipment like lathe machines, welding tools, or processing machines can be overwhelming. Supervision and step-by-step guidance from experienced engineers help students overcome this challenge.

Limited Availability of Spare Parts for Repairs

Like other industrial settings, At NIFOR necessary spare parts for machine repairs are not always available. This sometimes delay maintenance work and affect productivity. Students may have to learn how to source alternative components or improvise with available resources under supervision.

High Temperature Conditions in the Workshop

Workshops, especially those involving welding, generators, or oil palm processing, tend to have high temperatures due to heat-generating machinery. Prolonged exposure can cause discomfort, dehydration, and fatigue. We students are advised

to wear appropriate protective clothing, stay hydrated, and take necessary breaks to manage the heat.

4.3 SOLUTIONS TO ENCOUNTERED CHALLENGES

Guidance from Experienced Engineers

SIWES students receive supervision and mentorship from skilled engineers who provide practical knowledge, technical skills, and problem-solving techniques. This guidance helps students understand real-world applications of their theoretical knowledge.

Sourcing Alternative Spare Parts

When specific machine parts are unavailable, We learn how to identify and use alternative or compatible spare parts. This involves researching replacements, consulting engineers, and ensuring proper functionality without compromising machine performance.

Implementing Effective Cooling Strategies

Overheating is a common issue in industrial machines, so students are trained in different cooling techniques such as using water jackets, lubricants, cooling fans, and proper ventilation to maintain optimal machine performance and prevent damage.

4.4 SAFETY PRACTICES IMPLEMENTED

Strict Adherence to PPE Usage

Personal Protective Equipment (PPE) such as safety helmets, gloves, safety boots, goggles, and coveralls must be worn at all times to prevent injuries and ensure workplace safety. Proper PPE usage minimizes risks associated with mechanical operations and hazardous materials.

Regular Safety Briefings

Safety briefings are conducted to educate students on workplace hazards, emergency protocols, and best practices for accident prevention. These briefings help reinforce a culture of safety and ensure that all workers understand potential risks and safety procedures.

Proper Machine Handling Techniques

Proper training on how to operate, maintain, and troubleshoot machines is crucial to prevent malfunctions and accidents. SIWES students must follow standard operating procedures (SOPs), use machines within their specified limits, and seek supervision when handling complex equipment.

CHAPTER FIVE

5.0 EXPERIENCE GAINED

I was able to derive knowledge and skill on how to work in an industrial environment with different mechanical machines and tools. The SIWES training at NIFOR was an invaluable experience, providing exposure to real-world engineering applications.

5.1 RECOMMENDATION

Dealing with automobile engineering, the following should be considered:

i. More training programs should be organized for students.

ii. Institutions should collaborate with industries for better SIWES placements.

iii. Adequate safety measures should be enforced in all industrial environments.

5.2 CONCLUSION

Conclusively, the industrial work experience scheme (SIWES) is a beneficial program for engineering and science student in tertiary institutions. In fact, it's an eye opener to me particularly.

I think it will be of good improvement if our institutions can be equipped in terms of engineering and sciences.

APPENDIX

Fig. 3.1: OIL PALM PRUNING MACHINES

Fig. 3.2: LATHE MACHINE

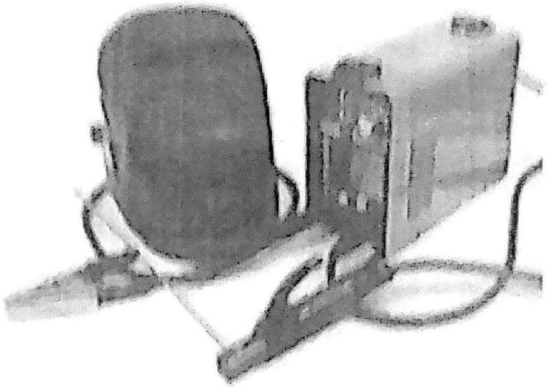

Fig. 3.3: WELDING MACHINES

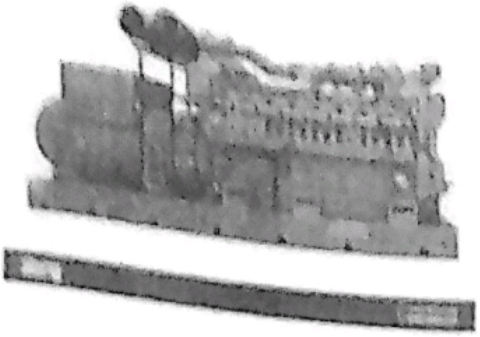

Fig. 3.4: GENERATORS AND POWER SUPPLY SYSTEMS

Fig. 3.5: PUMPS AND IRRIGATION SYSTEMS