AN INDUSTRIAL TECHNICAL REPORT

FOR

STUDENTS' WORK EXPERIENCE SCHEME

(SIWES)

HELD AT

EMINENT QUARRY LIMITED IBADAN, OYO STATE

PRESENTED BY:

BABATUNDE ADEOLU NATHANIEL

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THE DEPARTMENT OF MINERALS AND PETROLEUM RESOURCES ENGINEERING, INTITUTE OF TECHNOLOGY, KWARA STATE POLYTECHNIC, ILORIN.

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DEDICATION

I dedicate this report to Almighty God for His boundless grace, unwavering love, and immeasurable faithfulness, and for preserving my life throughout the duration of my SIWES program.

I also extend my heartfelt gratitude to my family for their unwavering support and encouragement during the entire training period, and to all my supervisors and colleagues for their cooperation and companionship throughout this journey.

ACKNOWLEDGEMENT

I am deeply grateful to Almighty God, who has graciously preserved my life from the beginning to the end of this training program. The experience was truly impactful, but it would not have been possible without the support and assistance of many individuals, to whom I owe my sincere thanks.

First and foremost, I would like to express my heartfelt gratitude to my supervisor I worked directly with. Their constant guidance, attention, and mentorship throughout the program were invaluable.

My appreciation also goes to my fellow SIWES students for their unwavering support and camaraderie.

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ABSTRACT

Student Industrial Work Experience Scheme (SIWES) is a compulsory skills acquisition training designed to give University, undergraduates in Nigeria appropriate practical knowledge, respective disciplines during their course of study and to understand the industrial application of the theoretical knowledge they acquire with the four walls of the lecture halls. The students are also expected to develop occupational competencies that would facilitate their fitting into the world of work after graduation. I was fortunate to serve my sixteen (16) weeks SIWES program with a well recognize company that offers both business and leisure activities. This report is a comprehensive summary of all that I learnt and was involved in throughout my SIWES Program.

CHAPTER ONE

INTRODUCTION TO SIWES

1.1 Historical Background of SIWES

The Students Industrial Work Experience Scheme (SIWES) is a skill acquisition initiative introduced by the Federal Government of Nigeria with the primary objective of bridging the gap between theoretical education and practical industrial experience for students in higher institutions. The scheme is designed to equip students in Engineering, Technology, Sciences, Agriculture, Medicine, Management, and other fields with hands-on experience that complements their classroom learning. The program applies to students in universities, polytechnics, monotechnics, and colleges of education across Nigeria.

SIWES was first introduced during the 1973/1974 academic session and was initially funded by the Industrial Training Fund (ITF). At the time, there was a growing concern that graduates lacked the necessary practical skills and industrial exposure to seamlessly integrate into the workforce. Many industries had to spend extended periods retraining newly employed graduates to equip them with practical skills. The scheme was created to address this deficiency by exposing students to real-world industrial environments during their academic programs, thereby reducing the time and cost involved in training them after graduation.

The scheme has since become an integral part of the Minimum Academic Standards (MAS) as established by the National Universities Commission (NUC), the National Board for Technical Education (NBTE), and the National Commission for Colleges of Education (NCCE). SIWES

plays a crucial role in ensuring that students, particularly in technical and vocational fields, experience the practical side of their studies before graduation.

1.2 Aims and Objectives of SIWES

SIWES is a strategic initiative designed primarily to facilitate the acquisition of relevant skills by students in their respective fields of study. By immersing students in real-life work environments, the program enhances their employability and prepares them for the challenges they will face upon graduation. Below are the specific objectives of SIWES:

Provide Industrial Placement: SIWES offers placement opportunities in industries for students enrolled in higher institutions. These placements are approved by the relevant regulatory authorities, such as the National Universities Commission (NUC), the National Board for Technical Education (NBTE), and the National Commission for Colleges of Education (NCCE). The aim is to allow students to acquire hands-on work experience and technical skills relevant to their academic programs.

Prepare Students for the Real Work Environment: The program helps prepare students for the realities of the workplace by allowing them to experience first-hand the dynamics of the work environment. This exposure gives them a clearer understanding of professional expectations and challenges, fostering a smoother transition from school to the workforce.

Enhance Future Employment Opportunities: By offering students exposure to potential employers and work environments, SIWES also serves as a networking opportunity. Students may establish contacts with industry professionals and companies, potentially enhancing their prospects for future employment.

1.3 Importance of SIWES

Since its inception, SIWES has played a critical role in shaping the quality of education and workforce readiness in Nigeria, particularly in the fields of science, engineering, and technology. Below are some of the key contributions of the SIWES program:

1. **Improvement in Science and Technology Education:** The program has significantly enhanced the practical aspect of science and technology education in Nigeria. By providing students with hands-on experience, it complements theoretical learning and produces graduates who are better equipped to apply their knowledge in practical situations.
2. **Increased Employment Opportunities:** Graduates who have participated in SIWES are more employable due to their exposure to real-world work environments. Employers tend to prefer candidates who possess not only academic qualifications but also practical experience, which SIWES provides.
3. **Better Standard of Living:** The program indirectly contributes to an improved standard of living by producing skilled graduates who are more likely to secure well-paying jobs in the industrial and technological sectors. This contributes to national development by creating a pool of highly skilled professionals.
4. **Production of Skilled Graduates:** SIWES ensures that students graduate with not only theoretical knowledge but also the practical skills necessary to thrive in their respective fields.

CHAPTER TWO

ORGANIZATION OVERVIEW AND STRUCTURE

2.1 History of Eminent Quarry Ltd

Eminent Quarry Ltd was established as a response to the growing demand for high-quality construction materials in Nigeria's booming infrastructure and real estate sectors. Headquartered in Lagos, Nigeria, the company has quickly risen to become a leading name in the quarrying and production of granite chippings used in road construction, building projects, and general civil engineering works across the country.

Since its inception, the company has focused on delivering top-grade aggregates to meet the needs of both government infrastructure programs and private sector developments. With a commitment to quality, safety, and environmental responsibility, Eminent Quarry Ltd has built a reputation for reliability and professionalism.

One of the company's most valuable assets is its strategically located quarry site at Kilometer 1, Old Bare Road, along the Lagos-Ibadan Expressway in Ibadan, Oyo State. The site sits on 200 acres (approximately 80.937 hectares) of land, rich with reserves of biotite granite and granodiorite rocks. These rocks belong to the Coast Granitic Complex, known for their excellent durability and strength, making them ideal for a wide range of construction applications.

Geological assessments and core drilling have confirmed that the reserve is extensive enough to support continuous operations for the next 150 years, ensuring sustainability and long-term supply. Over the years, Eminent Quarry Ltd has invested in modern equipment and skilled manpower, establishing itself as a reliable source of granite chippings in various sizes, which are in high demand across Nigeria.

2.2 Functions of Eminent Quarry Ltd

1. **Extraction and Processing of Granite Rocks**: The company extracts and processes granite from its site to produce chippings of various sizes used in construction.
2. **Supply of Aggregate Materials for Infrastructure Projects:** Eminent Quarry supplies quality granite products to contractors involved in road building, bridges, housing estates, and public utilities.
3. **Drilling and Blasting Operations:** The company engages in precision drilling and controlled blasting to break down massive rock formations for further processing.
4. **Crushing and Screening Services:** Granite rocks are crushed and screened into different sizes such as 6mm, 10mm, 14mm, 19mm, 25mm, 38mm, and quarry dust.
5. **On-Site Storage and Distribution:** The company maintains well-organized stockpiles of finished products for direct sale and delivery to clients.
6. **Environmental Sustainability:** Eminent Quarry is committed to operating in an environmentally sustainable manner, with proper waste management, noise control, and land rehabilitation strategies.

2.3 Units and Departments of Eminent Quarry Ltd

To efficiently manage its operations and deliver quality services, Eminent Quarry Ltd is structured into several specialized units and departments:

1. Operations Department

- **Drilling & Blasting Unit**: Responsible for controlled explosive operations to break rock formations.
- **Crushing & Screening Unit**: Handles processing of raw granite into various sizes.

- **Maintenance & Equipment Unit**: Oversees maintenance of heavy-duty machinery and ensures equipment uptime.

2. Sales & Marketing Department

- Develops marketing strategies and manages client relationships.
- Handles pricing, quotation, order processing, and after-sales services.

3. Logistics & Distribution Department

- Coordinates delivery of granite products to clients.
- Manages fleet operations and scheduling of haulage trucks.

4. Finance and Accounts Department

- Manages budgeting, invoicing, financial reporting, payroll, and tax compliance.

5. Administration & Human Resources Department

- Responsible for recruitment, employee relations, training, welfare, and overall office administration.

6. Health, Safety & Environment (HSE) Department

- Ensures compliance with environmental regulations and occupational safety standards.
- Conducts regular safety drills, inspections, and impact assessments.

7. Geology and Survey Department

- Carries out geological assessments, rock sampling, and reserve estimations.
- Works closely with the operations team to guide efficient extraction processes.

8. Procurement and Inventory Department

- Sources spare parts, equipment, fuel, and supplies necessary for daily operations.
- Manages inventory control and stock management.

CHAPTER THREE

3.1 Drilling

Simple drilling machines like hand held portable drilling machines, power feed drilling machines, etc. are quite common, we can find these machines everywhere. Often these machines are used for drilling a through hole over the job; these machines cannot be used for number of machining operations for specific applications. Human force is required to drill the hole, drilling depth cannot be estimated properly, job may spoil due to human errors, and different size holes cannot be drilled without changing the drill bit. Consumes lot of time for doing repeated multiple jobs, these all are the drawbacks. To overcome all these problems, this automated drilling machine is designed which is aimed to drill the holes automatically over a job according to the drilling depth data programmed through a key board. According to our survey report, we came to know that the machine designed here with a drilling machine is quite new, & there is no substitute available in the market.

The main concept of this machine is to drill the holes over particular jobs repeatedly at different depths, sequence is maintained. As the machine contains drill motor, the movement is controlled accurately. The mechanical transmission section is controlled with stepper motor, based on the drilling depth programmed through keyboard; the microcontroller restricts the movements of drill motor through stepper motor. Entire process falls under the subject of Mechatronics, & various fields of technologies must be included to full-fill the target.

Drilling is the operation of producing circular hole in the work-piece by using a rotating cutter called DRILL.

• The machine used for drilling is called drilling machine.

• The drilling operation can also be accomplished in lathe, in which the drill is held in tailstock and the work is held by the chuck.

• The most common drill used is the TWIST DRILL.

3.2 Types Of Drilling

a) Based on construction: Portable, Sensitive, Radial, up-right, Gang, Multi-spindle

b) Based on Feed: Hand and Power driven

TYPES OF CUTTERS

REAMERS: Multi tooth cutting tool

Accurate way of sizing and finishing the pre-existing hole.

Accuracy of ±0.005mm can be achieved

BORING TOOL: Single point cutting tool.

Boring tool is held in the boring bar which has the shank.

Accuracy of ±0.005mm can be achieved

COUNTERSINKS: Special angled cone shaped enlargement at the end of the hole

Cutting edges at the end of conical surface.

COUNTER BORE TOOL: Special cutters uses a pilot to guide the cutting action. Accommodates the heads of bolts.

Work Holding Devices

• Step Blocks

• Clamps

• V-Blocks

• Angles

• Jigs

• T- Slots Bolt

3.3 Precautions For Drilling Machine

• Lubrication is important to remove heat and friction.

• Machines should be cleaned after use

• Chips should be removed using brush.

• T-slots, grooves, spindles sleeves, belts, pulley should be cleaned.

SAFETY PRECAUTIONS

• Do not support the work piece by hand – use work holding device.

• Use brush to clean the chip

• No adjustments while the machine is operating

• Ensure for the cutting tools running straight before starting the operation.

• Never place tools on the drilling table

• Avoid loose clothing and protect the eyes.

• Ease the feed if drill breaks inside the work piece.

CHAPTER FOUR

4.0 BLASTERING OPERATIONS AT EMINENT QUARRY LIMITED

Blastering is a critical process in the quarrying industry, especially in rock excavation. During my SIWES training at Eminent Quarry Limited, I had the opportunity to observe and learn about the procedures involved in blastering, the materials used, and the specific functions each material performs in ensuring safe and effective rock blasting. This chapter explains these aspects in detail.

4.1 What is Blastering?

Blastering, commonly referred to as *rock blasting*, is the process of breaking down large rocks or rock masses into smaller, manageable sizes using controlled explosive techniques. In quarrying operations, this process is vital for loosening hard rock to make it easier for further processing such as crushing and transportation.

Blastering involves drilling holes into the rock, inserting explosives, and then detonating them in a controlled manner. The goal is to achieve efficient fragmentation with minimal ground vibration and fly-rock, ensuring safety and productivity in the quarry environment.

At Eminent Quarry Limited, blastering is conducted following strict safety protocols and with a high level of professionalism. Proper timing, explosive handling, and environmental consideration are key factors observed during each operation.

4.2 Materials Used for Blastering

Several materials are involved in the blastering process, each with a specific role in achieving the desired outcome. These materials include:

- **Explosives**
- **Detonators**
- **Detonating Cord**
- **Drill Rods and Bits**
- **Tamping Rod**
- **Water**
- **Fuses**
- **Blasting Mats**

4.3 Functions of the Materials Used

a. Explosives

These are the main agents responsible for breaking the rock. At Eminent Quarry Limited, the commonly used explosive is *Ammonium Nitrate Fuel Oil* (ANFO), which is cost-effective and safe when handled properly. The explosive is placed in drilled holes within the rock and detonated to produce shock waves that break the rock into fragments.

b. Detonators

Detonators are devices used to initiate the explosion of the main charge (explosive). They provide the necessary spark or heat to activate the explosive material. There are electric and non-electric detonators, and each is selected based on the blasting design. The use of detonators ensures that the blasting sequence is controlled and precise.

c. Detonating Cord

This is a flexible cord filled with high-explosive material used to transmit the detonation from the blasting cap to the main charge. It ensures synchronization of multiple blasts and is essential for coordinating the explosion of several holes at once.

d. Drill Rods and Bits

These are used in drilling holes into the rock before inserting explosives. The size and depth of the holes depend on the nature of the rock and the type of blasting required. Efficient drilling is key to the success of the blasting operation.

e. Tamping Rod

This tool is used to compact and secure the explosive material inside the drilled hole. It helps to ensure that the explosive is tightly packed, which improves the efficiency and direction of the blast. Using a non-metallic tamping rod is essential to avoid accidental sparks.

f. Water

Water is sometimes added into boreholes to reduce the risk of dust explosions, control fly-rock, and minimize environmental pollution. It also helps in stemming, which involves sealing the hole after inserting explosives to direct the force downward and into the rock.

g. Fuses

Fuses are used to ignite the detonators. In manual or non-electric blasting systems, time-delay fuses are used to allow the blaster to retreat to a safe distance before detonation occurs.

h. Blasting Mats

These are heavy-duty mats used to cover the blast area to prevent fly-rock from causing damage or injury. At Eminent Quarry Limited, safety is a priority, and the use of blasting mats is one of the measures taken to ensure the surrounding area and personnel are protected.

The blastering process is an essential part of quarry operations, and understanding the materials used and their functions helps to appreciate the technical and safety demands of the job. My experience at Eminent Quarry Limited gave me practical insights into how professional blasting is carried out, the precautions taken, and the importance of each material in achieving successful rock fragmentation.

CHAPTER FIVE

SUMMARY, CONCLUSION, RECOMMENDATIONS, AND SUGGESTIONS

5.1 Summary

This report provides a detailed account of the Student Industrial Work Experience Scheme (SIWES) undertaken at **Eminent Quarry Limited**. The training was designed to expose students to real-life industrial practices and enhance their theoretical knowledge through hands-on experience. During my time at the quarry, I was privileged to observe and participate in several important operations.

5.2 Conclusion

The SIWES program at Eminent Quarry Limited was an eye-opener into the practical aspects of quarry operations. It bridged the gap between classroom theory and field application, especially in areas such as blastering and material handling. I learned that successful quarry operations require not only technical skills but also strict adherence to safety procedures and environmental considerations.

The hands-on knowledge gained has enriched my academic journey and has also prepared me for future responsibilities in the construction and mining industries. My understanding of blastering, drilling, and site safety has significantly improved, and I am now more confident in applying this knowledge in real-world scenarios.

5.3 Recommendations

Based on my experience during the industrial training at Eminent Quarry Limited, I would like to make the following recommendations:

1. **For Students:**
    - Students should take the SIWES program seriously as it provides valuable practical exposure that cannot be gained in the classroom.
    - They should show eagerness to learn, ask questions, and actively participate in daily operations.
2. **For Eminent Quarry Limited:**
    - The company should continue to support industrial training programs and ensure that students are properly guided and exposed to different departments.
    - More interactive sessions or workshops should be organized to help students understand complex operations like blasting in more depth.
3. **For Tertiary Institutions:**
    - Institutions should prepare students adequately before the commencement of SIWES, especially on safety and workplace ethics.
    - There should be proper follow-up and supervision to ensure that students are learning effectively at their assigned places of attachment.