A TECHNICAL REPORT ON
STUDENTS INDUSTRIAL WORK EXPERIENCE SCHEME
(SIWES)

HELD AT:
MECHANICAL ENGINEERING DEPARTMENT AT KWARA STATE POLYTECHNIC'S MINI-CAMPUS

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ACKNOWLEDGEMENTS

My sincere gratitude goes to Mechanical Engineering Department, Kwara State Polytechnic for providing an exceptional platform for professional growth during my SIWES internship. The nurturing environment cultivated by the Department not only facilitated insightful learning but also fostered a spirit of collaboration and support.

DEDICATION

This report work is dedicated to the Almighty God, the creator of the universe, the one who made me whom I am today, also to all those that have been there for me from the beginning of this four month program.

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CHAPTER ONE
INTRODUCTION
1.0 INTRODUCTION TO SIWES
Brief History of SIWES

The Industrial Training fund established by decree 43 was introduced in 1971, vis-à-vis the birth of the Students Industrial Work Experience Scheme (SIWES) the same year by the Federal Government of Nigeria (FGN). It is against this background that the industrial training fund (ITF) initiated, designed and introduced SIWES Scheme in 1973 to acquaint students with the skills of handling employers' equipment and machinery.

The Industrial Training Fund (ITF) solely funded the scheme during its formative years. However, due to financial constraints, the fund withdrew from the scheme in 1978. The Federal Government, noting the significance of the skills training, handed the management of the scheme to both the National Universities Commission (NUC), and the National Board for Technical Education (NBTE) in 1979. The management and implementation of the scheme was however, reverted to the ITF by the Federal Government in November, 1984 and the administration was effectively taken over by the industrial training fund in July 1985, with the funding solely boned by the Federal Government. It is an integral part of the requirements for the award of Certificates, Diplomas and Degrees in institutions of higher learning, e.g. Colleges of Education, Polytechnics, Universities, etc.

1.1 Objectives of SIWES

The objectives of SIWES programme include to:

- Provide an avenue for students in Institutions of higher learning to acquire industrial skills and experience in their respective courses of study.
- Prepare students for the Industrial Work situation they are likely to experience after graduation.

- Expose students to work methods and techniques of handling equipment and machinery that may not be available in their Institutions.
- Make the transition from school to the world of work easier; and enhance students' networks for later job placements.
- Provide students with an opportunity to apply their knowledge to real work situations, thereby bridging the gap between theory and practice; and
- Enlist and strengthen Employers' involvement in the entire educational process; thereby preparing the students for employment in Industry and Commerce.

CHAPTER TWO

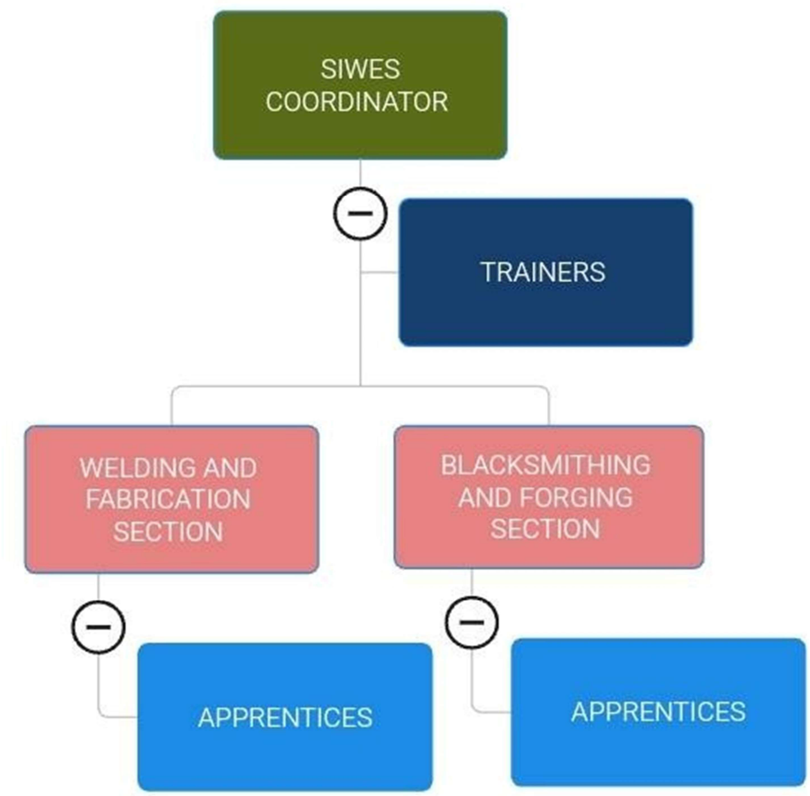
PLACE OF ATTACHMENT OVERVIEW

2.0 BACKGROUND OF THE PLACE OF ATTACHMENT

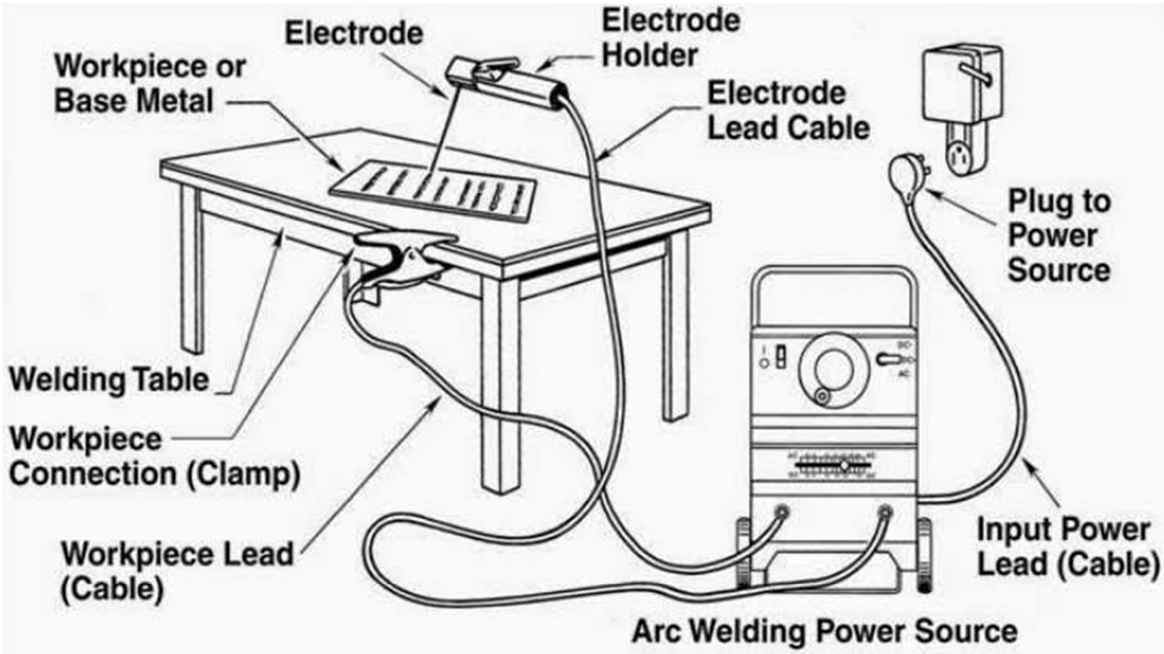
The Mechanical Engineering Department at Kwara State Polytechnic's mini-campus serves as the focal point for my SIWES experience. Established to provide hands-on training and practical exposure to students, the department has evolved as a hub for mechanical engineering activities within the academic setting.

With a foundation deeply rooted in the educational mission of Kwara State Polytechnic, the department's historical background showcases a commitment to equipping students with practical skills essential for their future careers. The establishment of the Mechanical Engineering Department aligns with the institution's dedication to fostering a holistic learning environment.

2.1 ORGANIZATIONAL CHART



WELDING AND FABRICATION SECTION

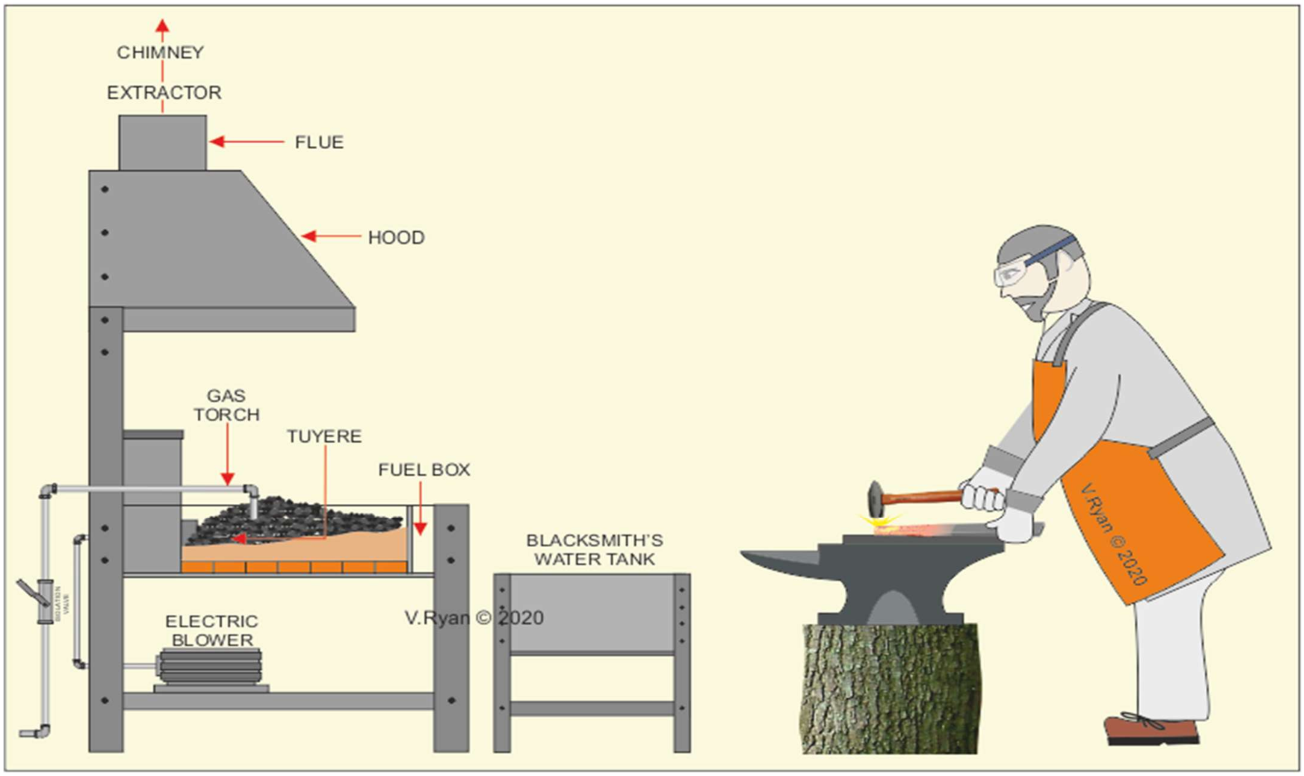


Welding, as a fundamental skill, involves the art of joining metals through various techniques such as gas welding, arc welding, and spot welding. In the Welding and Fabrication Section, students learn the nuances of these techniques, understanding how to create sturdy and precise connections between metal components. Fabrication extends this process, enabling students to transform raw materials into intricate metal structures, showcasing their creativity and technical prowess.

The Welding and Fabrication Section within the Mechanical Engineering Department at Kwara State Polytechnic's mini-campus serves as a dynamic hub where students delve into the practical applications of metallurgical engineering. This Section focuses on equipping students with skills essential for metal joining, fabrication, and the realization of diverse metal structures.

Students actively engage in practical exercises, working with a range of welding machines, including gas welding equipment and arc welding machines. The Section provides a platform for hands-on experience in welding different materials, interpreting technical drawings, and executing fabrication projects. From constructing basic structures to intricate metal frameworks, students gain proficiency in the essential skills of welding and fabrication.

BLACKSMITH AND FORGING SECTION



Blacksmithing involves the manipulation of heated metals to achieve specific shapes and forms. The Forging Section focuses on the art of forging, where metals are heated and hammered into desired configurations. This section not only imparts practical skills but also fosters an appreciation for the historical significance of blacksmithing in the evolution of metallurgy.

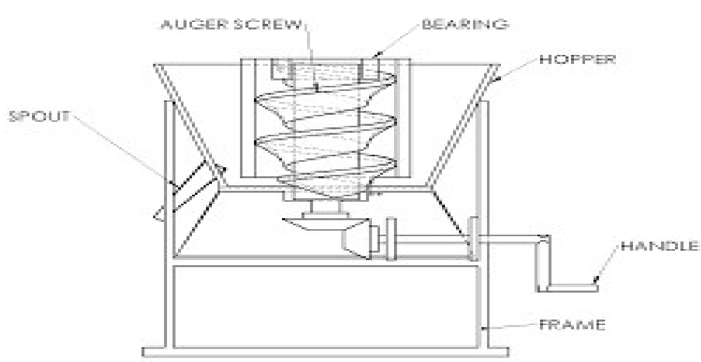
In the Blacksmith and Forging Section, students learn to work with heated metal, understanding the principles of temperature control, hammering techniques, and the selection of appropriate tools for forging.

SPECIFIC MACHINES USED

Hydro Lift Out Crucible Furnaces

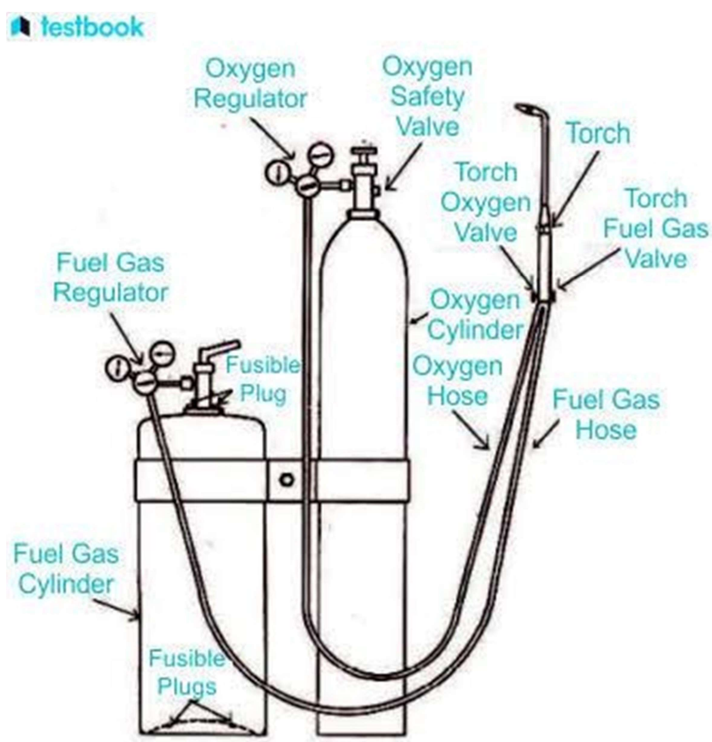
The Hydro Lift Out Crucible Furnaces stand as a cornerstone in the metallurgical processes conducted within the Mechanical Engineering Department. These furnaces play a vital role in the melting and casting of metals, offering students hands-on experience with the intricate procedures involved. The furnace's design allows for precise control of temperature and facilitates the safe handling of molten metals, contributing to a comprehensive understanding of metallurgical principles.

Sand Mixer



The Sand Mixer is a key component in metallurgical processes, especially in the preparation of molds for casting. Students engage with the Sand Mixer to understand the intricacies of sand preparation, a fundamental aspect of ensuring the quality and integrity of castings. The hands-on experience with the Sand Mixer connects theoretical knowledge with practical application, emphasizing the significance of proper mold preparation in metallurgical engineering.

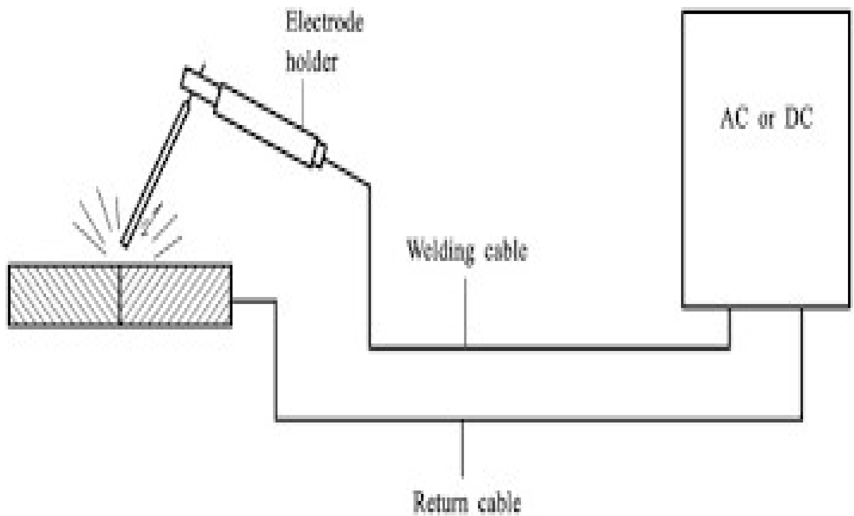
Gas Welding Machine



Gas Welding

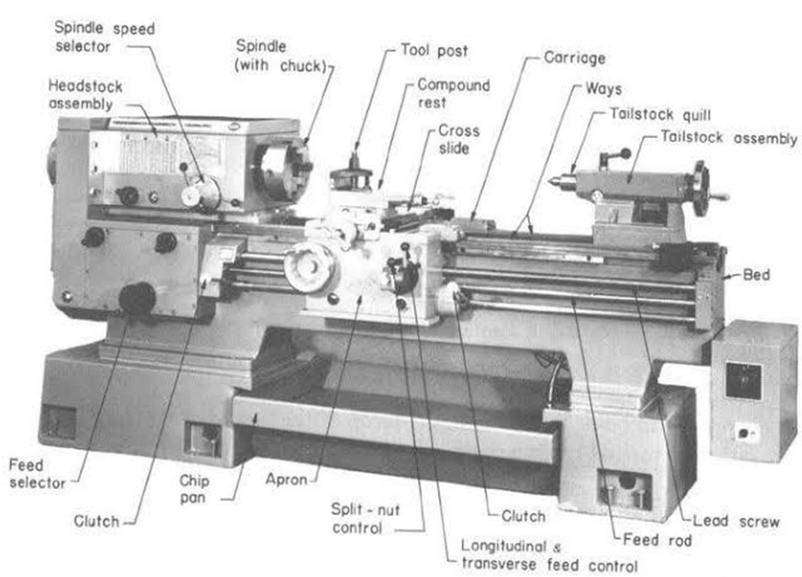
Gas welding is a foundational skill in metallurgical engineering, and the Gas Welding Machine serves as a primary tool for students to develop proficiency in this area. Through practical exercises, students gain hands-on experience with gas welding techniques, safety protocols, and the intricate art of joining metals using this versatile equipment.

Arc Welding Equipment



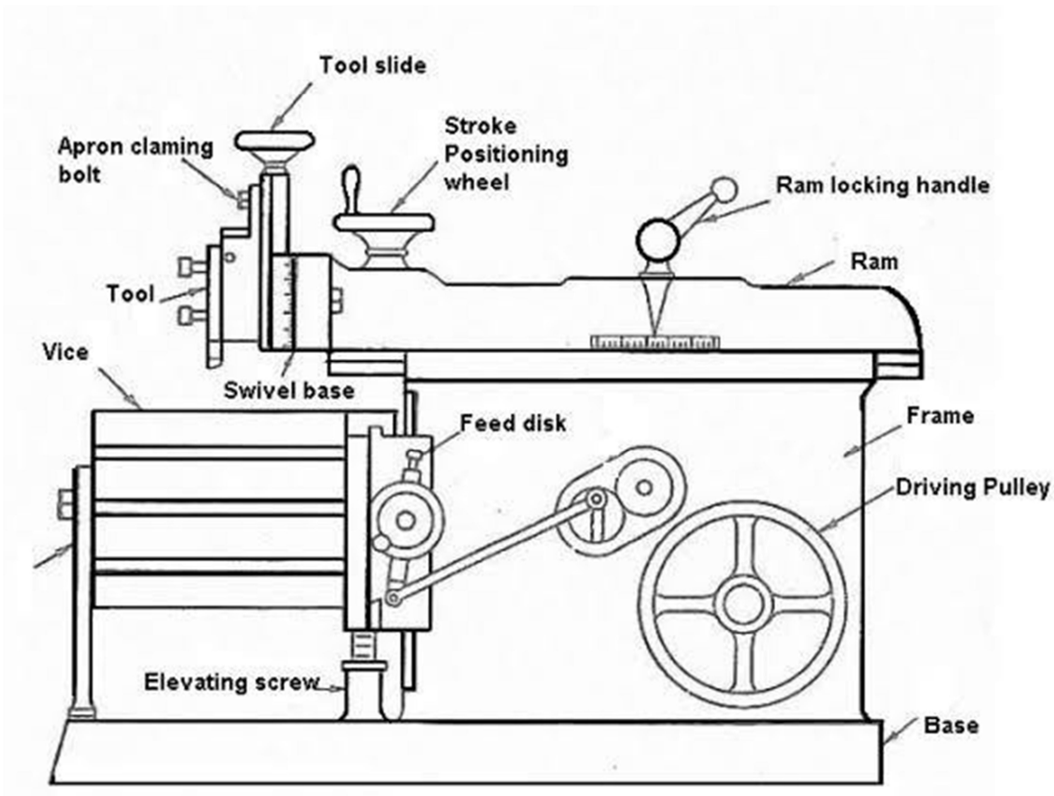
Arc welding is a cornerstone technique in mechanical engineering, and students are exposed to various types of Arc Welding Equipment. This includes welding machines that utilize different types of electrodes and welding processes. Through hands-on exercises, students acquire skills in arc welding, contributing to their ability to perform precision metal joining and fabrication.

Lathe Machine



The Lathe Machine is a versatile tool in metallurgical workshops, enabling students to perform precision turning and shaping of metals. Its application ranges from creating cylindrical components to intricate machining tasks. Students learn to operate the Lathe Machine, gaining proficiency in metalworking techniques that are fundamental to various mechanical processes.

Shaping Machine



In the arsenal of mechanical machinery, the Shaping Machine stands out for its ability to shape and form metal workpieces with precision. Students engage with the Shaping Machine to understand the principles of metal shaping, honing their skills in creating components with specific geometries and dimensions

CHAPTER THREE

WORKSHOP SAFETY

3.1 IMPORTANCE OF WORKSHOP SAFETY IN MECHANICAL ENGINEERING

Workshop Safety is paramount in mechanical engineering, where hands-on activities involving heavy machinery, high temperatures, and potentially hazardous materials are commonplace. The importance of workshop safety cannot be overstated as it ensures the well-being of personnel, prevents accidents, and safeguards the integrity of the work environment.

In mechanical engineering, adherence to safety protocols is crucial for minimizing risks associated with the handling of metals, operation of machinery, and exposure to various processes. A commitment to workshop safety not only protects individuals but also contributes to the overall efficiency and productivity of operations.

3.2 SAFETY PROTOCOLS IN WELDING AND FABRICATION

Welding and fabrication involve intense heat, molten metals, and intricate machinery. Safety protocols in these areas encompass the proper use of personal protective equipment (PPE), such as welding helmets, gloves, and flame-resistant clothing. Additionally, workers are trained on fire prevention, proper handling of welding equipment, and maintaining a well-ventilated workspace to mitigate exposure to fumes.

Emphasis is placed on hazard identification and risk assessment, ensuring that potential dangers are recognized and addressed before initiating any welding or fabrication tasks. Regular equipment inspections, fire drills, and emergency response training further enhance the preparedness of individuals in the workshop.

3.3 SAFETY PROTOCOLS IN BLACKSMITH AND FORGING

Blacksmith and forging operations involve the shaping and manipulation of metals through heating and hammering processes. Safety measures in these operations include controlled heating procedures, proper handling of hot materials, and the use of safety gear like heat-resistant gloves and aprons.

Workers are trained to maintain a safe distance from hot surfaces and to handle tools with care to prevent accidents. Emergency procedures for handling burns or injuries are established, and fire extinguishers are strategically placed to address potential fire hazards.

3.4 HANDLING AND MAINTENANCE OF HYDRO LIFT OUT CRUCIBLE FURNACES

Hydro lift out crucible furnaces are utilized in metallurgical processes for melting and casting metals. Safety in handling and maintaining these furnaces involves proper training on loading and unloading crucibles, monitoring temperature controls, and understanding emergency shutdown procedures.

Maintenance protocols include routine inspections to identify any wear and tear, ensuring that components are in good working condition. Workers are educated on the potential risks associated with furnace operations, emphasizing the importance of vigilance and adherence to safety guidelines.

3.5 SAFE PRACTICES WITH GAS WELDING MACHINES AND ARC WELDING MACHINE

Gas welding machines and arc welding present unique safety challenges due to the use of open flames, high temperatures, and intense light. Workers are educated on the safe setup of gas welding equipment, proper storage and handling of cylinders, and the use of protective screens to shield against harmful UV radiation during arc welding.

Safe practices involve the correct positioning of welding equipment, ensuring proper ventilation to prevent the accumulation of fumes, and implementing lockout/tagout procedures to control energy sources during equipment maintenance. Regular training and awareness programs reinforce the importance of personal responsibility for safety in these operations.

CHAPTER FOUR

PERSONAL INVOLVEMENT AND EXPERIENCES

4.1 EXPERIENCES IN WELDING AND FABRICATION

My engagement in the Welding and Fabrication section during my SIWES program provided a rich learning experience in the art and science of metal joining. I immersed myself in theoretical concepts and practical applications, mastering various welding techniques such as gas welding, arc welding, and spot welding. The learning process involved understanding the properties of different metals, interpreting technical drawings, and developing proficiency in using welding equipment.

My practical application involved executing welding projects, ranging from basic joints to complex fabrications. Working with diverse materials, I honed my skills in creating strong and precise connections. This hands-on experience allowed me to translate theoretical knowledge into tangible outcomes, showcasing my ability to contribute to the creation of metal structures.

4.2 EXPOSURE TO BLACKSMITH AND FORGING TECHNIQUES

My hands-on experience involved working with heated metals, applying various forging techniques to create distinct shapes and forms. Through practical exercises, I gained proficiency in the art of forging, mastering skills in temperature control, hammering precision, and the selection of appropriate tools. This exposure broadened my understanding of metal shaping, linking traditional practices with contemporary metallurgical concepts.

4.3 OPERATION AND MAINTENANCE OF HYDRO LIFT OUT CRUCIBLE FURNACES

My involvement in the operation of Hydro Lift Out Crucible Furnaces delved into the core of metallurgical processes. I learned how to load and unload crucibles, monitor temperature controls, and execute safe operating procedures. This hands-on experience with specialized furnaces provided insights into the intricacies of metal melting and casting, highlighting the significance of precise temperature control and safety protocols.

In addition to operation, my experiences extended to the maintenance of Hydro Lift out Crucible Furnaces. I participated in routine inspections, ensuring that components were in optimal working condition. This aspect of my involvement underscored the importance of equipment maintenance in sustaining reliable and efficient metallurgical processes.

4.4 HANDS-ON EXPERIENCE WITH SAND MIXER, GAS WELDING MACHINE, AND ARC WELDING

Experience with Sand Mixer:

My hands-on experience with the Sand Mixer involved actively participating in the preparation of molds for casting. I engaged in the process of sand mixing, understanding the critical role it plays in ensuring the quality and integrity of castings. This practical exposure reinforced my theoretical knowledge, emphasizing the importance of proper sand preparation in metallurgical processes.

Gas Welding Machine and Arc Welding:

My practical involvement with Gas Welding Machines and Arc Welding Equipment contributed to the development of welding skills. Through hands-on exercises, you became adept at using these machines to join metals efficiently and precisely. The exposure to gas welding and arc welding techniques equipped you with valuable skills applicable to various metallurgical applications.

CHAPTER 5

RECOMMENDATIONS AND CONCLUSION

5.1 RECOMMENDATIONS

Recommendations to the Place of Attachment

- Continuous Equipment Maintenance:

It is recommended that the place of attachment prioritizes regular maintenance of the metallurgical equipment, especially the Hydro Lift out Crucible Furnaces, Sand Mixer, Gas Welding Machine, and Arc Welding Equipment. Implementing a proactive maintenance schedule ensures the longevity and optimal performance of these critical tools.

- Expanded Practical Projects:

Encouraging a diverse range of practical projects in the Welding and Fabrication Department and the Blacksmith and Forging Section can enhance the experiential learning of students. Expanding the scope of hands-on projects will provide students with exposure to a wider array of challenges, fostering creativity and innovation.

- Integration of Emerging Technologies:

Considering the rapid advancements in metallurgical engineering, integrating emerging technologies into the curriculum and workshops can keep students abreast of industry trends. Exploring technologies such as digital modeling, computer-aided design (CAD), and simulation tools can enrich the learning experience and prepare students for the evolving landscape of metallurgy.

Recommendations to the Polytechnic

- Curriculum Enhancement:

The polytechnic is encouraged to periodically review and enhance the metallurgical engineering curriculum to align with industry demands. Introducing new courses or modules that cover emerging trends and technologies in metallurgy will ensure that students receive a well-rounded and up-to-date education.

- Industry Collaboration:

Fostering closer ties with industries related to metallurgical engineering can provide valuable insights and opportunities for students. Collaborative efforts, such as internships, workshops, and guest lectures from industry professionals, can bridge the gap between academic knowledge and real-world applications.

- Investment in Infrastructure:

Continued investment in state-of-the-art infrastructure and equipment is crucial for maintaining the polytechnic's reputation as a center of excellence in metallurgical engineering education. Upgrading laboratories, acquiring the latest machinery, and ensuring a conducive learning environment contribute to the overall educational experience.

5.2 CONCLUSION

In conclusion, the SIWES program at the Mechanical Engineering Department, Kwara State Polytechnic's mini-campus, has been a transformative experience. The exposure to welding and fabrication, blacksmithing, operation of specialized furnaces, and hands-on engagement with essential equipment has provided a holistic understanding of mechanical engineering.

The recommendations put forward aim to enhance the quality of education and practical training within the institution and the place of attachment. Continuous improvement in equipment maintenance, the introduction of innovative projects, integration of emerging technologies, and fostering collaboration with industries will contribute to the sustained excellence of the metallurgical engineering program.

This SIWES journey has not only equipped me with technical skills but has also instilled a deep appreciation for the intricacies of metallurgy. As I move forward in my academic and professional journey, the experiences gained during this program will undoubtedly shape my perspective and contribute to my success in the field of mechanical engineering.