Introduction

1.1. I worked for ///////////////// as a materials engineer located in ////////////////////Most of the activities I was involved with included reverse engineering, repair and maintenance of //////////////, the exact location of project //////////////, heavy machineries unit. The client of project was ///////////////// and contractor was /////////////////. The total duration of project was 20 months namely one year and 8 months out of which I worked for 15 months. I worked in a team of 3 as materials engineer in a collaborative team environment. The project started on Dec. 21, 20/////// and was completed on July 23, 20/////; though on this project in specific I joined it on April 20, 20//// as a materials engineer.

Background

1.2. The project was included in different phases including documents and deeds collection from main parts manufacturing company, equipment reverse engineering, conducting tests, researches and manufacturing of parts and quality control on them as well as parts installation and assembly. I was assigned as materials engineer (metallurgist also) in the special team of project and I was in full team work with mechanical and repairs technical office.

1.3. I worked in this project as a team member of materials engineering team and I was responsible mainly to determine materials of all equipment parts in production stage up to completion, prepare required information and perform quality control on the manufactured parts using my knowledge of materials engineering and metallurgy as well.

1.4. The objective of project was localization of equipment and increase of repair speed in the future years especially in annual repairs of related industrial unit considering client dire need to use this equipment during annual repairs which was highly used and its readiness was highly significant. I collected the existing documents from technical unit and studied the materials of the parts in question. I determined the materials for all parts using PMI machine and started matching them with the recorded material in the documents.

Personal Engineering Activity

1.5. Lack of access to the main materials of some parts and the need for balancing with existing materials at the market, inquiring prices on the existing materials out there at the market and replacing it considering mechanical properties of the pertinent part was a major issue I dealt with in this project. The solutions I planned for this part were requesting materials from overseas, placing order of materials to the domestic manufacturers, and final one which I chose was using

replacing materials considering lower costs despite the need for more efforts. I made sure of proper performance of the manufactured parts and tried to use materials that are always accessible for the simplification of repairs process in the future.

1.6. I researched about different materials existing out there in the market considering the situation of part, physical and mechanical properties as well as required corrosion for the considered part, I performed tensile, hardness, metallography, and other tests. I studied books in mechanical metallurgy, engineering alloys, steel key, cast iron key, copper key, and aluminum key. I studied ASM handbook as well as ASTM standards.

1.7. I used internet widely for searching on science websites to find required information in specific and sometimes I visited many other. I used MS Excel and Access and prepared technical documents for each part including type and production method, and as built drawings and heat treatment process. I prepared a report to introduce replacing materials and compare conducted tests results.

1.8. I performed tests, studied required resources, and extracted a good deal of information from variety of resources and analyzed results finally. Considering economic sanctions imposed on our country at the time, I had problems accessing many materials. I worked in a team of 4 and I divided the responsibilities in a just manner and tried to follow a team work approach. Regarding duties such as PMI, preparing documents and sending parts as well as receiving results, analysis of them in addition to other activities, I tried to distribute such activities between team.

1.9. I kept cooperating and helping in all other activities. I had meetings with managers, engineers, and repairs unit technicians as well as client mechanical installations experts and engineers. I collected required information including access to data, existing data amount, vulnerability of some parts and exact placement place of them.

1.10. Extracted information from these meetings in selection of replacement materials and how to do the tests were very effective. I found and suggested replacing material considering the variety of existing materials and considering the company financial situation etc. I applied ASTM, ISO, and DIN standards. I cooperated to mechanical and electrical engineers. I applied different metallography equipment including light microscope, different agents such as HCl, HF and HNo3, as well as PMI equipment including Spectro.

1.11. I coordinated to the planning unit and studied existing prices in the market; I tried to make the best purchases at the same time the most efficient material which of course considering economic sanctions was inevitable. I had meetings with planning unit and divided the work procedure and performed required scheduling for each stage considering probable problems. I always care about safety. I was making sure use of safety equipment such as masks, gloves, work clothing, safety googles etc. I used fan for exhaustion of gases.

1.12. After manufacture of parts, all activities including parts quality control stages considering metallurgist stage such as type, hardness, and heat treatment were handled by metallurgy unit which I was a part of it as well helping. I performed studies on fittings, and performed non-

destructive tests such as PT, MT and VT. Majority of documents in project were English, and all information on the internet were also English. I divided all existing responsibilities for project conduction in a way that people were involved in all activities equally.

1.13. I studied on standards and handbooks as well as other existing references. I researched on current materials and existing ones at the market; I corresponded to the materials manufacturers and working with experienced people, I gained valuable experiences. I had daily meetings with other materials engineers in analysis and study of results. I attended meetings with managers and client engineers. I gained valuable information out of these meetings.

1.14. I had to search and find information about heat treatment process for some parts that I lacked information in technical documents, determining process and parameters. I used variety of resources to find the best heat treatment regime to manufacture considered part according to its performance and need to favorite properties. I performed mechanicals on the thermally processed operations samples using different methods to find the most optimized method and study whether obtained results are different from tests conducted on the main part.

1.15. I prepared report from optimized heat treatment method and compared the results with outcome results from tests performed on the main parts and then prepared the final report. Considering lack of information in provided technical documents, I performed a lot of studied on the way of performing heat treatment to achieve desired properties. I had good deal of consultations; I talked to mechanical engineers and university professors in mechanical and metallurgy fields and received good deal of consultations.

1.16. The project was commissioned successfully and then completed. All solutions were studied in team meetings and management was fully informed about final decision. In some occasions, the solutions were denied considering lack of access to the requested materials and alternative solutions were provided.

Summary

1.17. Client was satisfied about the way project was done and results of the project made him happy; though in my opinion it was possible that there was more need required to perform the project with higher quality materials and apply more accurate tests on the parts to achieve more safety, however due to client dire need for faster completion of project, we ignored many things.

1.18. I studied different resources and standards and practically applied them at work; moreover, I cooperated to experienced people and more knowledge had better role in my scientific betterment. As a professional material engineer I see problems and barriers as a good opportunity

to learn and for troubleshooting them, I used the existing facilities or the ones that we could procure; I did my best in this regard as a professional materials engineer.

Introduction

2. 1. I worked for ////////////// materials engineer located in ////////////////////. The project was //////////////. The exact site of project was ////////////////; the client and contractor was ///////////////. The project took 4 months in total and I was materials engineers assigned with metallurgical responsibilities as well. I worked in this project from the start to the completion. The project started in 21.05.20/////// and completed in 10.09.20//////.

Background

2. 2. The project was collection of documents and deeds of the manufacturing company including catalogues, existing drawings and worked standards as first phase, second phase was BOP disassembly and separation of parts, third phase of project was called reverse engineering and preparing defective parts drawings as well as measurement of parts, design and reverse engineering, and final phase we defined as manufacture of defective parts, BOP repair and reassembly.

2. 3. ////////////// assigned me as the materials engineer in this project responsible to study and perform required studies on the defective parts for its replacement with the new material. I performed the required studies and researches. I communicated to the technical office departments, client mechanical engineers, metallurgical engineers, mechanical, superintendent, and production unit manager as well as contractor company management. I determined the type of defective parts and performed feasibility study on changing the defective part according to the client request.

2. 4. ////////////'s function is to control output gas and oil from oil well and prevents outburst of gas and oil. Considering vulnerability of this part and high working pressure as well as oil well corrosive environment, any type of change in the applied materials in the BOP parts required comprehensive attention and studies as well as making sure of proper performance of it.

2. 5. The objective of project was repair and remanufacture of BOP used and unusable parts; and return the equipment back to service. For conducting this project, as a materials engineer, I worked directly under company management and in coordination to the production unit and purchasing unit. I received the required documents from technical unit, studied the material of the parts and then in the first step determined their material and type using PMI. I used corrosion standards especially Nace MR0175.

Personal Engineering Activity

2. 6. One of the issues was needing to change the material of defective part at the request of client, considering high vulnerability of BOP any changes in the materials required considering all dimensions and parameters as well as probable problems in addition to high security. I considered different options such as purchase and or manufacture of a completely similar part to the defective one and replacement of it. Or sending an order and assigning the work to other companies or research and study on the faulty part and manufacture of a new part with new material.

2. 7. My favorite was the last option considering client opinion on the need to change the defective part and the fact that previous material was not satisfactory. Moreover, I had the required team and personnel trained enough to perform the tests according to the standards to make sure of proper performance of part in the existing work condition. I opted out of other alternatives considering the costs and time required which was a lot more than the average. I carried out HIC and SSC tests.

2. 8. According to the MR0175, to make sure of proper performance of suggested materials, I carried out HLC and SSC tests as well as tensile and hardness ones. The defective part was working in the H2S (Hydrogen Sulfide) holding environment and for this reason the most important factor in replacement of the part was HIC, SCC, and SWC in the H2S environments. I used ASM handbook vol. 13 and NACE (MR0175) standard as well ASTM standards; I widely used internet for collection of information regarding application and vulnerability of part. I collected more information about materials corrosion.

2. 9. I extracted various types of information, studied different standards, and performed tests on the new materials in a way as a research work I can recall. I cooperated with two of my colleague and we divided the responsibilities and duties in the best way possible. For example, regarding metallography, PMI and preparation of documents and parts and receipt of results, as well as its analysis, reverse engineering, and redesign of part, drawing as built drafts for the new parts and many other works in this project, I applied my competencies in human resources management and assigned different responsibilities to different people. I was a cooperative person at work either as a team member or a team leader.

2. 10. I attended different meetings with managers, technicians, and engineers in repair, engineering, and maintenance units. I attended several meetings regarding receipt of all information required including access to information, amount of existing information, vulnerability of part and exact place of them. I studied the surrounding environment of parts as well. The information I extracted from these meetings in the selection of replacing material and how of performing tests was very effective.

2. 11. I used NACE standards and made sure of proper performance of replacing materials and how the tests were performed. I applied ATM, and NACE standards. I worked with mechanical

engineers and experts in corrosion. I received good deal of information. I tried to classify the information.

2. 12. The equipment in metallography included light microscope, all types of sanding, agents, and equipment such as PMI including a set of Spectro for studying the type of materials at all stages. I also worked with mechanical test equipment such as tensile, fatigue and hardness test equipment. In this project, because the project was a genuine one for them, planning unit was not involved scrutinizing the situation and I as a professional material engineer just personally performed researches, studies and planning as well as classification and prioritization of works.

2. 13. I had a good care in selecting the materials. I selected a well equipment lab also to work in the project and make sure of the proper tests being conducted and I studied all outcome results in a way. Majority of documents as well standards were in English language, also there were existing information on the internet in English language. I improved my English on a continuing professional development basis in this project. I learnt a lot. I mentored and I accepted mentoring. In the meetings also, during the warmup, I would start explaining some procedures on the internet just to make sure that everyone understands what we are doing and what our plans were.

2. 14. I performed good deal of studies on the standards, handbooks, and other references. I also researched about materials existing in the market and different manufacturers out there. I researched about the current materials and materials out there in the market. I corresponded to different manufacturers.

2. 15. I worked with other team members who were more experienced and I gained valuable experiences in this regard. Other than the materials engineers that I worked with them, daily, I transferred, analyzed, and studied the information and results available. I had various meetings with other team members who had more experiences; I gained valuable deal of information. Other than meetings I had with materials engineer, I talked to the managers and client reps. As I said good conclusions were made regarding materials and parts required for project.

Summary

2. 16. Since I worked according to the world up to date standards, it was very welcomed by client. Most of the solutions were studied and done in a team gathering and then management would come in and start commenting. The project completed with success and client was happy in almost all aspects in the beginning, though throughout the project there were a lot of doubts and problems on the way we were carrying out the research and how to attain favorite results that fortunately within a good teamwork and with high quality we achieved the results which was practical as well and I consider it a great success.

2. 17. As a professional engineer, I believe my main duty is to see the problems and try to obviate them in all ways possible especially using existing facilities and considering the situation and

according to the client conditions. I did my best in this regard and tried a lot so that I could build up a good team work and success toward the objectives of the project.