



**AMA International University BAHRAIN**

Salmabad, Kingdom of Bahrain

**PRACTICUM/ON-THE-JOB TRAINING PROGRAM**

2<sup>nd</sup> Trimester, S.Y. 2019 – 2020

**PRACTICUM ACCOMPLISHMENT REPORT**

Presented to:

**DR. SATHEES KUMAR NATARAJ**

Practicum Adviser

College of Engineering

In Partial Fulfillment

Of the Requirements for the Degree

Bachelor of Science in Mechatronics Engineering

By:

**FAIZAAN MOHAMMED MUSTAFA**

**BH16500026**

APRIL 2020



**APPROVAL SHEET**

Approved by the Practicum Committee with a grade of \_\_\_\_\_%

*S junaid*

**ENR. JUNAID AL HASSANI**  
Training Supervisor

**DR. SATHEES KUMAR NATARAJ**  
Practicum Adviser

**DR. BEDA T. ALETA**  
College of Engineering

**FINAL APPROVAL**

Accepted and approved in partial fulfillment of the requirements for the degree in Bachelor of Science in  
Mechatronics Engineering.

**DR. BEDA T. ALETA**  
College Dean



Student Trainee : FAIZAAN MOHAMMED MUSTAFA

Student ID No. : BH16500026

Section : BSME

E-mail ID/Telephone No. : bh16500026@amaiu.edu.bh / +973 35572137

Training Institute : ALMEER SAUDI TECHNICAL SERVICES CO.

Address : KHOBAR, SA

Date Finished : 4/16/2020

**PRACTICUM COMMITTEE**

**ACTION TAKEN**

**DR. SATHEES KUMAR NATARAJ**

Practicum Adviser

\_\_\_\_\_

**DR. BEDA T. ALETA**

College of Engineering

\_\_\_\_\_



**MR. JUNAID AL HASSANI**  
Training Supervisor

*S junaid*

---

**RECOMMENDATION FOR ON-THE-JOB TRAINING**

This On-The-Job Training (OJT) prepared and submitted by Faizaan Mohammed Mustafa in partial fulfillment of the requirements for the degree in Bachelor of Science in Mechatronics Engineering is hereby submitted to the Practicum Committee for consideration.

**DR. SATHEES KUMAR NATARAJ**

Practicum Adviser



## **ACKNOWLEDGMENT**

I would like to express my sincere gratitude to Almeer Saudi Technical Services Co. for their continuous support in providing me the training that I needed for completing the Practicum component of my degree in Bachelor of Science in Mechatronics Engineering.

I would also like to thank my trainer Eng. Junaaid Al Hassani and Eng. Sarvanand for their continued supervision and feedback on the assignments that were given to me at the office from the beginning.

**Student Name : FAIZAAN MOHAMMED MUSTAFA**

**Student No. : BH16500026**



# TABLE OF CONTENTS

	<b>Page#</b>
<b>TITLE PAGE.....</b>	<b>1</b>
<b>APPROVAL SHEET.....</b>	<b>2</b>
<b>RECOMMENDATIONS FOR ON-THE-JOB TRAINING .....</b>	<b>4</b>
<b>ACKNOWLEDGMENT.....</b>	<b>5</b>
<b>TABLE OF CONTENTS.....</b>	<b>6</b>
<b>CHAPTER:</b>	
<b>1. Chapter 1 – Company Background</b>	
a. History.....	9
b. Vision.....	10
c. Mission.....	11
d. Company Goals and Objectives.....	11
e. Services Offered.....	14
f. Organizational Structure.....	17
g. Location Map.....	18
<b>2. Chapter 2 - Narration and Evaluation of Related Experience</b>	
a. Practicum Orientation (Before deployment and at the workplace) .....	19
b. Practicum Objectives .....	19
c. Training Benefits.....	20
d. Scope of Work.....	21
e. Insights from all Phases of Training.....	22
f. Work Issues and Concerns.....	30



g. Recommendation.....	31
h. Conclusion.....	31
<b>3. Chapter 3 - Narrative Report.....</b>	<b>32</b>
<b>4. Chapter 4 – WBL Practical Assessment.....</b>	<b>38</b>
a. Student’s Practical Questionnaire	
b. Trainer’s Practical Questionnaire	
c. Adviser’s Practical Questionnaire	
<b>5. References.....</b>	<b>39</b>

## **APPENDICES (Attached Separately)**

- i. Memorandum
- ii. Application Letter
- iii. Curriculum Vitae
- iv. Acceptance Letter
- v. Request for endorsement letter
- vi. Training Agreement Form
- vii. Training Plan Outline
- viii. Business Card
- ix. Daily Time Record/Daily Work Accomplishment Report
- x. Summary of Attendance and Work Accomplishment Report
- xi. Vicinity Map
- xii. Photos of OJT Activities
- xiii. Certificate of Completion
- xiv. Evaluation of Competencies



xv. Performance Evaluation

xvi. Practicum Accomplishment Report Evaluation Form

## LIST OF FIGURES

Figure No.	Title	Page
1.	Phase Chart.	22
2.	Workshop 2D Electrical drawing.	26
3.	Blind Flange 3D Model.	28

## LIST OF TABLES

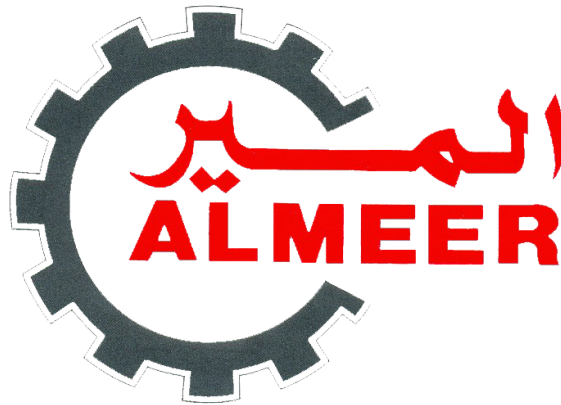
Table No.	Title	Page
1.	Services Offered.	16





# CHAPTER 1

## COMPANY BACKGROUND



### 1.1 History:

Almeer Saudi Technical Services Co. W.L.L is a private company registered in Saudi Arabia that was established in 2009 and is a part of the Almeer Group (Est. In 1978). The focus of the company has been on providing quality services in Oil production facilities, Refineries, Petrochemical plants, Power plants, etc. to fulfill the needs of different clients in Saudi Arabia (“Total Solution Provider”, 2020). The importance in Services for disciplines including Civil, Structural, Mechanical, Electrical, Instrumentation & Controls and Telecommunications has been upheld by the company. Also, Almeer has attained seamless project execution skills in many sectors of the petrochemical and electrical industries.

With a rich history of experience of over 40 years as a part of the Almeer Group, Almeer Technical Services Co. which is the parent company of Almeer Saudi based in



Kuwait has supported the development of Almeer Saudi Technical Services Co. in profound ways (Shepherd, 2016). The group has had a record of technical excellence in Engineering Procurement & Construction (EPC), Lump Sum Turnkey (LSTK), Lump Sum Procure & Build (LSPB) and Services Projects based on Maintenance in Oil & Gas Plants, Refineries, Petrochemicals, Fertilizers, Power, Utility, Water, Mining and Allied Process Industries ("Total Solution Provider", 2020). The corporate philosophy of the company has been focused on continued and consistent maintenance of the highest levels in customer services with flexibility and support. Almeer is certified for its Quality Management System, Environmental Management System, Occupational Health and Safety Management Systems following ISO 9001, ISO 14001 and OSHAS 18001 standards ("Total Solution Provider", 2020).

## **1.2 Vision:**

Almeer's Vision has been to achieve technical excellence in the highest levels towards customer satisfaction to have steady growth with innovation and employee motivation while building recognition and reputation in the current era.

## **1.3 Mission:**

Almeer's mission is to strive for the highest quality standards in satisfying its clients that meet and that also go beyond the expectations of those clients. Since Quality and Safety is the



corporate commitment of the company; Almeer will always try to comply and improve its offerings through continued insistence on Expertise, Professionalism, Quality Services, Customer support and Consistency that will lead to operational growth within the company.

## 1.4 Company Goals and Objectives

**Goal:** Almeer's goal is to become a world class Engineering, Procurement and Construction(EPC) Contractor in the Industrial Construction and Plant Services and also a preferred supplier of Construction Materials and Human Resource Services in the GCC region.

### **Objectives:**

#### **1. Excellent Customer Service**

Almeer's objective of having a Good customer service is based on it's outlook of creating a service that serves its clients completely which helps in retaining clients and in generating repeated revenue.

#### **2. Productivity of People and Resources**

For driving the company's employees towards creativity and productivity, Almeer has made the necessary investments in employee training, equipment maintenance and also equipment upgrades.

#### **3. Employee Attraction and Retention**



By maintaining a productive and positive employment environment, Almeer's efforts towards retaining creative and productive employees continues as employee turnover is generally costly with a loss in productivity.

#### **4. Mission-driven Core Values**

The core values of Almeer relate to the importance of customer interaction, responsibility towards the community and employee satisfaction as they are important for creating a positive corporate culture.

#### **5. Sustainable Growth**

To achieve sustainable growth, Almeer uses historical data and future projections with careful considerations on company resources such as finances and personnel.

#### **6. Getting and Staying Profitable**

To maintain profit, the revenue must always be greater than the costs which are very important to Almeer when doing business. Controlling costs in both production and operations while maintaining a profit margin is essential for the long term.

#### **7. Maintaining a Healthy Cash Flow**



While having a good cash flow, Almeer has upheld the importance of developing different financing contacts for times when capital is needed to expand the organization. By maintaining the ability to finance efficiently, a company can prepare for long-term projects while addressing short-term needs such as payroll and account payments.

## **8. Dealing with Change**

The ability to deal with change is important in an unpredictable environment and thus, a change management process is required while the organization grows in a developing marketplace. Almeer's objective for dealing with change includes the development of a dynamic organization that can deal with the challenges of the industry,

## **9. Reaching the Right Customers**

The objective of reaching the right customers is very important to Almeer and therefore, proper marketing that not only includes advertising and getting customer input is emphasized but also, the development of business partnerships is also upheld in growing the company's market share.

## **10. Staying Ahead of the Competition**



As the competition grows within the industry, Almeer values a comprehensive analysis of the activities that are ongoing in the marketplace. Developing an understanding of the products that are ranked within a marketplace gives a stronger idea to a company on how that company can improve its standing among consumers and also improve project revenue.

## 1.5 Services Offered:

Almeer is known as one of the leaders in offering complete solutions to major process industries with a wide Engineering scope from Kuwait to Saudi Arabia, Bahrain, UAE, Iraq, and India. The projects that are performed by the company include:

- DESIGN & DETAIL ENGINEERING
- EPC PROJECTS
- TURNKEY PROJECTS
- PLANT INSTALLATIONS
- OIL & GAS PIPELINES
- NON-METALLIC AND COATED PIPING
- STATIC & ROTARY EQUIPMENT ERECTION
- HVAC & ELECTROMECHANICAL PROJECTS
- ELECTRICAL POWER GENERATION AND DISTRIBUTION PROJECTS



- ELECTRICAL SYSTEMS UPGRADES
- CATHODIC PROTECTION SYSTEMS
- PLANT INSTRUMENTATION AND CONTROL SYSTEMS
- POWER & INSTRUMENT CONTROL SYSTEMS UPGRADES & MODERNIZATION
- FIRE & GAS, ENVIRONMENTAL AND ANALYTICAL SYSTEMS
- FIELD & IN-HOUSE CALIBRATION OF INSTRUMENTS & ANALYTICAL SYSTEMS
- MAINTENANCE SERVICES PROJECTS
- OVERALL PLANT & REFINERY MAINTENANCE
- ROTATING & STATIC EQUIPMENT MAINTENANCE
- SHUTDOWN & TURNAROUNDS
- INDUSTRIAL & PIPELINE SERVICES
- VALVES OVERHAULS, REPAIR & MAINTENANCE
- ELECTRICAL & INSTRUMENTATION SYSTEMS MAINTENANCE
- TESTING & COMMISSIONING SERVICES

The services offered by the company vary in various disciplines of engineering and included in Table I.

TABLE I. Services Offered

<b>Mechanical</b>	<b>Electrical</b>	<b>Instrumentation</b>
<p>A. Plant Installations including Piping, Static and Rotating Equipment.</p> <p>B. Maintenance planning, Condition Monitoring, Diagnostics, Routine, Preventive and Breakdown maintenance of Static &amp; Rotating equipment.</p> <p>C. Maintenance of Oil &amp; Gas production facilities, Well heads, Pipelines &amp; Manifolds</p> <p>D. Turnaround / Shutdown maintenance of Petrochemical plants, Refineries &amp; Oil &amp; Gas installation.</p> <p>E. Valves Maintenance, Refurbishment &amp; Overhauls</p> <p>F. Bolt Tensioning Services</p>	<p>A. Construction, Testing and Commissioning of Low, Medium and High Voltage Switchgear buildings, Substations, Transmission &amp; Distribution Systems and other Electrical Systems.</p> <p>B. Upgrade and modernization of Electrical Systems.</p> <p>C. Electrical Systems Operation,</p> <p>D. Electrical Controls &amp; Protection Systems, installation, operation and Maintenance.</p> <p>E. Comprehensive Maintenance, troubleshooting, and condition monitoring of Electrical Systems and equipment.</p>	<p>A. Installation, Testing, Calibration and Commissioning of Process Instrumentation &amp; Control Systems.</p> <p>B. Installation, Commissioning and Maintenance of DCS, PLC, SCADA, Ancillary Control Systems, Telecommunication, Plant Surveillance, Wireless Systems, Fire Alarm Control and Fire &amp; Gas Detection Systems.</p> <p>C. Instrument and Control Systems Upgrades and Modernization.</p> <p>D. Control Systems Integration, Configuration, FAT, SAT and associated services</p> <p>E. Calibration, test and repair of Process Instrumentation.</p> <p>F. Plant Automation Solutions.</p>



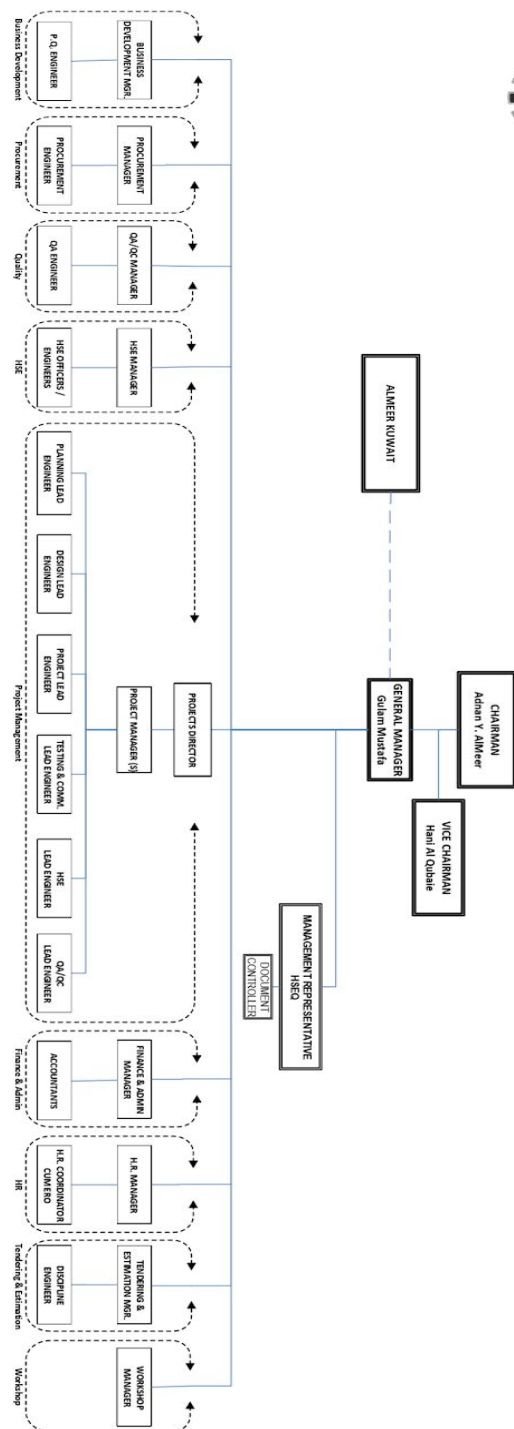


## **1.6 Organizational Structure:**



**ALMEER SAUDI TECHNICAL SERVICES CO.**

## ORGANIZATION CHART



Doc. No. : ASTSC/QMS/OC-D003  
Issue / Rev No. : 01/ 00 ; Dated : 01.10.2018

Prepared by : Mohammed Khaja Moin Uddin  
Management Representative  
(ISO Implementation)

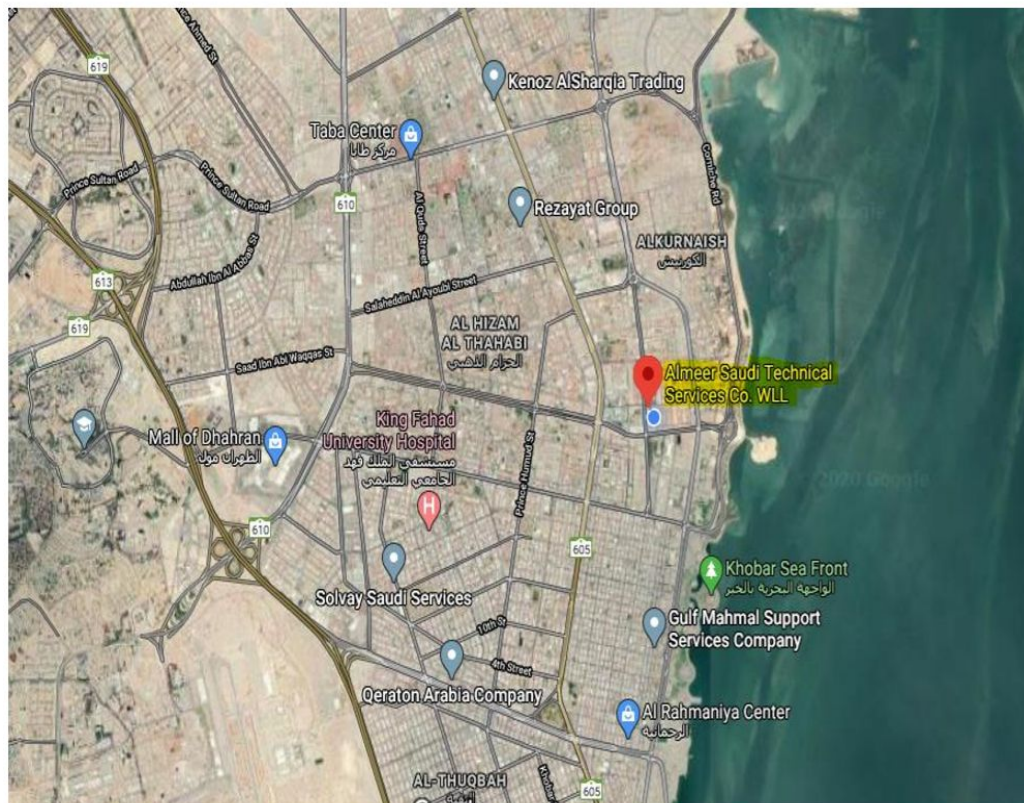
Approved by : Gulam Mustafa  
General Manager

## 1.7 Location Map:



Google Map Location: 26.3123732, 50.1922194

<https://www.google.com/maps/place/Almeer+Saudi+Technical+Services+Co.+W.L.L./@26.3123732,50.1922194,9453m/data=!3m1!1e3!4m5!3m4!1s0x0:0xfdb6d91b43fc575a!8m2!3d26.3108274!4d50.2174437>



## CHAPTER 2



## NARRATION AND EVALUATION OF RELATED EXPERIENCE

### 2.1 Practicum Orientation:

Before deployment, I was provided a letter of request for On-The-Job-training(Practicum) by Mr. Hussam Hubail who is the Head of Placement, Linkages, and Alumni. I was also given an overview of the hours required to complete the training. I had submitted this letter to Almeer Saudi Technical Services for approval. After receiving the acceptance letter, I had forwarded that letter to my practicum advisor Dr. Sathees Nataraj. Later, my practicum advisor contacted me and provided me all the necessary documents including the format for the final report. Therefore, I was prepared to document my training experience for my final On-The-Job-training(Practicum) report.

### 2.2 Practicum Objectives:

1. To understand Engineering, procurement and construction projects.
2. To attain industrial skills for planning and executing different oil and gas jobs.
3. To observe a company's organization, management, and planning for maintenance and project execution.
4. To gain experience in project costing.



5. To use SolidWorks for designing 2-D and 3-D engineering drawings for different engineering projects.
6. To understand a company's asset and inventory management system.

## **2.3 Training Benefits:**

1. The student can comprehend and understand different maintenance, engineering, and instrumentation job quotations highlighting different tasks.
2. The student attains the skill of project scoping from quotations and engineering drawings for finding the tasks that are asked within those quotations and engineering drawings.
3. The student can gain experience in constructing different engineering designs using SolidWorks.
4. The student witnesses how a company manages its assets and inventory.
5. The student achieves a broad understanding of engineering projects that include DCS(Digital Control System), ESD(Emergency Shutdown System), CCS(Compression Control System), and VMS(Vibration Monitoring System) systems.

## **2.4 Scope of Work:**



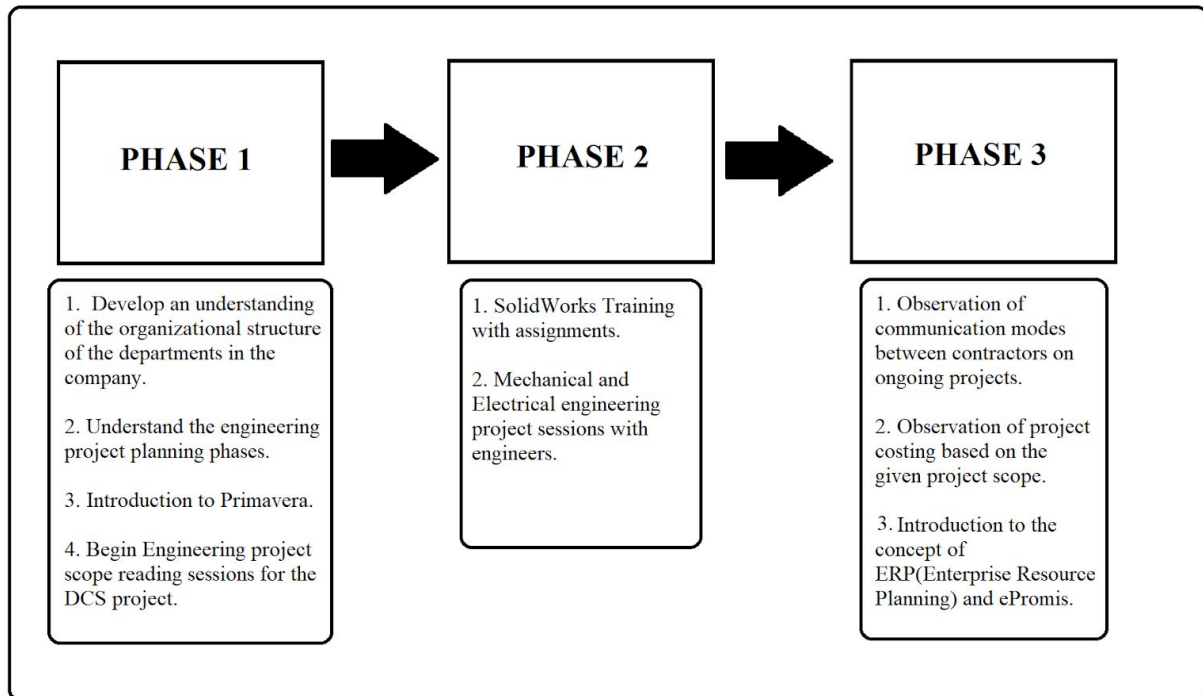
The student was given the task to read through different project scopes especially the DCS maintenance job for gaining an idea on how to highlight important tasks that are necessary for project planning. The student was also given access to a company owned Solidworks license for accessing an online Solidworks training program by the Solidworks platform to make the student gain an understanding of project modeling and engineering design.

Later, the student was tasked to make an engineering drawing of an electrical power supply system with a changeover switch on the Solidworks platform for a Jubail industrial workshop owned by Almeer. The student has interacted with various engineers that have expertise in mechanical, electrical and maintenance fields for understanding the specific projects which the engineers had done based on their expertise. Mostly, the student was tasked to undergo the SolidWorks training while learning the stages involved in starting and commencing an engineering project.

## **2.5 Insights from all Phases of Training:**



*The practicum training was divided into three phases as described below:*



**Fig.1 Phase Chart**

**Phase 1:** The initial phase of the training included meeting with engineers in the E&I department. I started understanding the organizational structure of the department and the work that was performed by the engineers in the department. Project planning phases in engineering projects were introduced to me, and I was also given a project reading for one of the major projects of the company where the task was to upgrade Distributed Control Systems at the Saudi Aramco Abqaiq Oil Field by replacing old PROVOX I/O modules of the DCS system with newer DELTA V CHARMs I/O modules with the installation of a Fire alarm system. The DELTA V CHARMs I/O modules were provided by Emerson Electric.





Initially, I was introduced to the three project planning phases that most engineering projects undergo including Engineering, Procurement, and Construction. For the Engineering phase, important tasks such as creating an engineering drawing of the area in focus, finding sustainable solutions to the engineering application and more steps related to project planning are performed. This would normally take around a year as it takes time to get accurate engineering drawings and also, the appropriate solutions. For the Procurement phase, important resources are allocated from the inventory or purchased for the project. Proper budgeting with the focus on maintaining profitability and sustainability while also acquiring the essential supplies is key to success for this phase. For the construction phase, the manpower and the required equipment is deployed to the site, and the tasks that are mentioned in the project scope are performed. The activities in each phase are planned and are assigned a cost beforehand by the contractor and are submitted to the project owner in a bid to get the project rewarded by that project owner. Once the project is rewarded, the contractor can start working on the project from the first phase (Engineering) until the completion of the project. In Almeer, a software known as Primavera is used for planning and costing the activities that occur in each phase. I was introduced to the Primavera software by my trainer Eng. Junaid Al Hassani where he showed me how he planned the different stages of engineering project planning including Engineering, Procurement, and Construction for his previous projects. I learned how Primavera can be used for assigning tasks such as delivering supplies from one place to the other. The duration and the manpower were assigned for certain tasks. I was also shown different project Gantt charts in the Primavera software by my trainer. Another





benefit of using this software includes estimating costs of the activities associated with the project daily and also, adding general rates such as the cost of a Nitrogen(N<sub>2</sub>) gas cylinder which may be used for a lot of mechanical applications. Thus, proper project planning is essential to attain success in a project and software such as Primavera are essential tools that make project planning easier yet comprehensive.

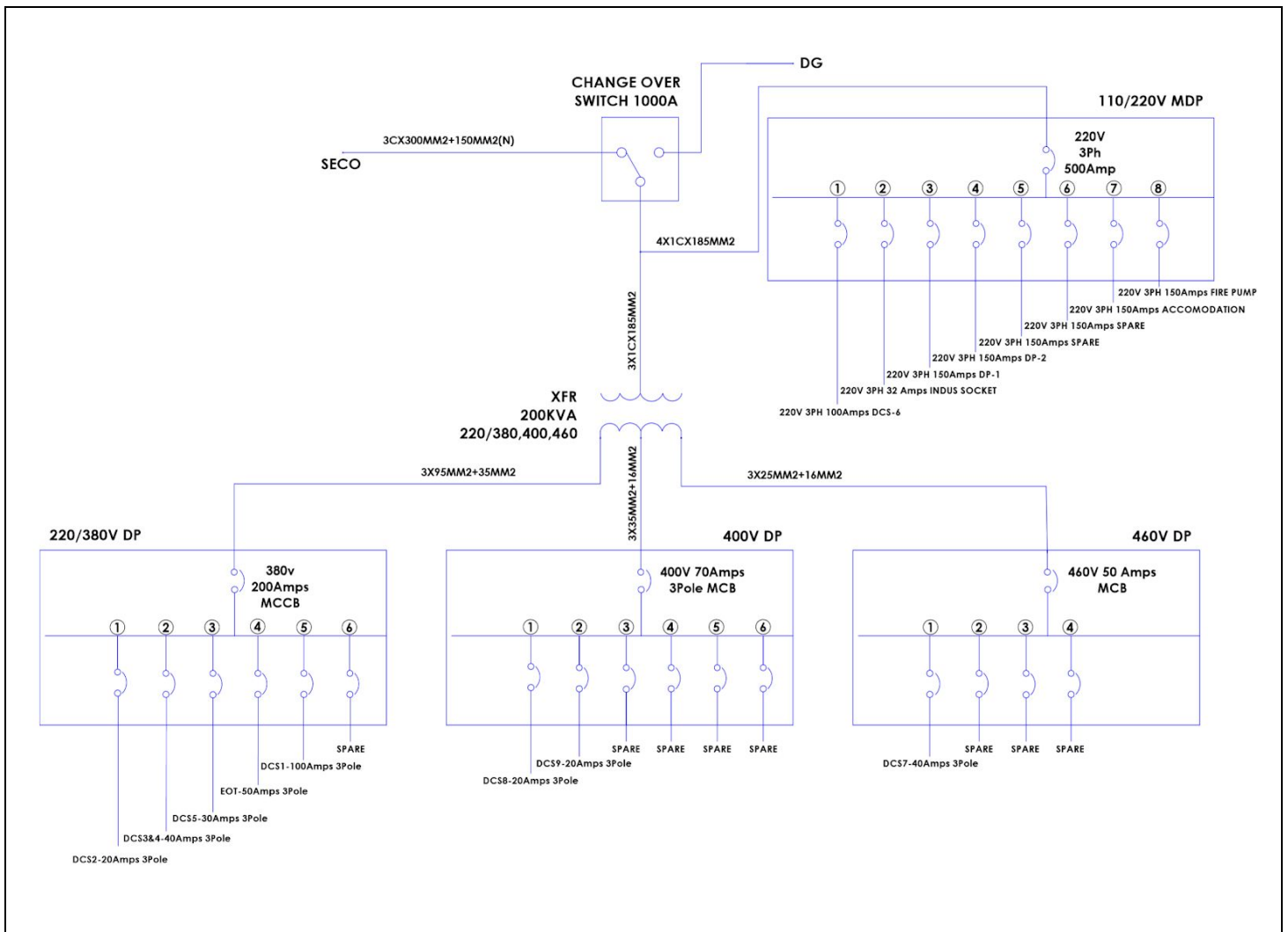
There are 2 DCS projects that Almeer has been associated with since March 2018. The first project involved upgrading the DCS system(Distributed Control System) I/O cards at the Abqaiq plant that was completed in early 2019 and for the second project, a project bid had been submitted and is awaiting approval. I was taught how a project scope should be read by an engineer by analyzing the tasks that are highlighted with the inclusion of engineering drawings for the DCS project. The project scope was provided by the project owner Saudi Aramco with Almeer Saudi Technical Services and Emerson Electric being the LSTK(Lump Sum turnkey) contractors. The distributed control systems were located at different zones in the Abqaiq plant. The task required scoping the major work areas and the risk areas on the engineering drawings provided by Aramco. To perform the task that has been mentioned in the project scope, the DCS systems must initially be shut down which halts the oil and gas separation process at a few oil wells. Thus, proper scoping and planning are essential as there will be a loss that is incurred during the duration of the shutdown. The project scope also included many project design standards that conformed with the Saudi Aramco Engineering Standards, International Codes and Standards, and practices. The general requirements of the LSTK contractor



were stated including Instrumentation & Process Control System requirements, Safety requirements, and General requirements.

The DELTA CHARM I/O modules provided by Emerson Electric for the DCS System and were placed at their respective cabinets. Firstly, the PROVOX I/O modules were removed from the cabinet and demolished. Then, new mounting plates were installed on the cabinets with CHARM I/O modules and FTA modules. The I/O points were then wired in each CHARM module to existing terminal blocks with the ferrules at each end based on the vendor design. Later, a High Sensitivity Smoke detector(HSSD) is installed. Redundant cooling fans and air filters were installed on cabinet doors. The fans were then connected to a power supply and airflow detectors were connected to the DCS alarm door. A temperature sensor was then connected to each cabinet and DCS system. Heat dissipation calculation was later made for each cabinet and airflow study was performed as well to avoid overheating from the CHARMS controllers and power supply. Apart from the main task, side jobs were also mentioned in the project scope including assigning a Fire Alarm Control Panel, providing new cabinets, and other maintenance activities. Overall, I had observed the engineering drawings of the DCS systems, the areas on the scope for the project and also; drawings of the process instruments that were connected to the DCS project systems.

**Phase 2:** The next phase of my training involved learning the SolidWorks software for building models and 2-D drawings that were based on the electrical and mechanical engineering project sessions that I had with the engineers at Almeer



**Fig.2 Jubail Workshop 2D Electrical drawing.**

On the 26th Feb. 2020; I was tasked to make an electrical diagram for an ongoing E&I(Electrical & Instrumentation) upgrade project that consisted of a manual changeover switch that switched power from one source to another for Almeer's Jubail's workshop. The 2-D drawing for the Jubail workshop was completed and is shown in figure 2. The two sources consist of power feeding from the Saudi Electrical Company(SECO) and a Diesel Generator. The changeover switch switches the power from one source to the other if one of the sources is not supplying power. The power is feeding into a separate line and a transformer for amplifying and dividing the current into three supply lines.



This drawing was made as a guide for this project as a Diesel Generator was added as a second source of electricity for this workshop.

The mechanical concepts of MothBalling and Re-Validation which are applied for performing Hydraulic tests on gas and oil pipes were introduced to me by Eng. Mujeeb who specializes in Mechanical engineering projects at Almeer Saudi . These procedures are industrially followed to test if there are any leakages in the pipes that are used when pumping out oil and gas from oil wells to gas and oil separation plants(GOSPs).

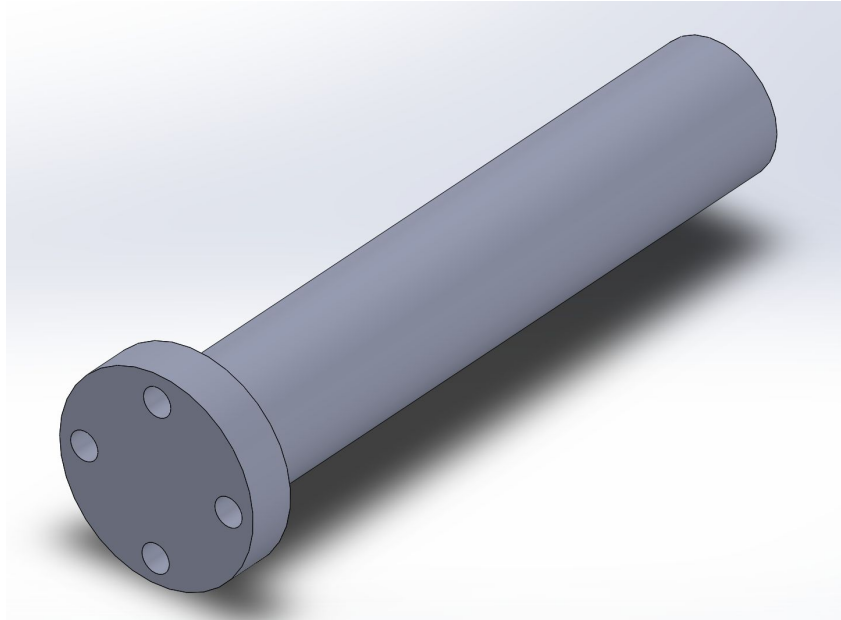
MothBalling consists of 9 steps including:

1. Dropping or separating the spool from the pipeline
2. Blinding the ends with a blind flange
3. Scraping of dirt within the pipe with a scrapper
4. Pumping in water
5. Measuring if the desired pressure is achieved, dewatering the pipe
6. Scrapping again to remove unwanted dirt boxing up or attaching the spool back to the main pipeline
7. Adding nitrogen gas(N<sub>2</sub>) to purify the pipeline with an inert gas.
8. When removing the spool, a part of the complete pipeline is removed by removing the flanges on both sides that separate that spool from the oil/gas wells and the GOSP manifold.
9. Blind flanges are then placed on both ends of the wells to block any leakages from both ends

If no leakages are detected in the pipe during the test, the pipe can securely be used in the main channel of the GOSP. It was noted that the Re-Validation procedure consists of the first 8 steps in Mothballing. After the session on Mouth-Balling and



Re-Validation of pipelines, I started designing a 3D model of Flang that was connected to a pipeline in SolidWorks which is shown in Figure 2.



**Fig. 3. Blind Flange 3D Model**

**Phase 3:** The third and final phase of the practicum involved attending meetings for observation on the communication modes between contractors on ongoing projects, learning about projects, and learning about the benefits of using Enterprise Resource Planning(ERP).

Communication is key when collaborating with different companies. I had learned that being ready with the essential documents including the project scope, the costing



sheets, and the costing rates is important before attending any meetings with the company employees or with external contractors. Between the contractors, it was essential to communicate with them effectively to make deals that would benefit both parties. This would cause the beginning of a business relationship between the parties for future collaborations on upcoming projects. I have observed that in Almeer; the engineers would politely deal with other companies as they update each other on their ongoing projects. They would kindly end their meetings by exchanging kind words for each other's effort towards their respective jobs that are related to the project and also, they would exchange their business cards which is a corporate ethic after a meeting between the contractor ends.

The concept of Enterprise Resource Planning(ERP) was introduced to me by Eng. Junaid as I observed the preparation of the asset and inventory lists for transfer to the ePROMIS ERP software platform. The idea behind it was for giving employees better accessibility to the company asset and inventory as those employees planned for their respective projects. If an engineer assigns a certain item from the inventory list to his project plan, he would need to get approval from the project manager first which happens digitally as the project manager is notified about the request for allocation by the engineer within the software platform. The actions can be taken much quicker by using the digital platform with the engineer getting approval while keeping the project manager informed. The project inventory list is also updated and can be viewed by the system admin regularly. Thus, using Enterprise Resource Planning(ERP) software greatly helps a corporate company in managing that company's inventory and assets while maintaining a seamless process for gathering the essential resources needed for ongoing projects. Almeer's transition to ePromis is expected to happen in the summer as the company finalizes its inventory and asset list.

## **2.6 Work Issues and Concerns:**

During my practicum, there came a period where I was suddenly asked to work from home as the Saudi government had asked the private sector companies to close their offices to avoid the spread of COVID-19. This was a cause of concern for me as I was planning to get more involved in some ongoing projects at Almeer Saudi. Thus, I had to work from home on my 3-D DCS system architecture in SolidWorks as it was a task that was possible for me to perform at home.

## **2.7 Recommendation:**

My recommendations to the company would be to develop countermeasures to combat the effects of a pandemic like COVID-19 or any catastrophic event that can significantly affect the workflow of the company. Countermeasures, such as developing an e-meeting platform for online meetings and of course, the promotion of Enterprise Resource Planning(ERP) software that could enable an engineer to plan a project from an up-to-date platform while that engineer works from home.

## **2.8 Conclusion:**

The time that I have spent at Almeer Saudi Technical Services Co. has been very special as I met engineers who were very friendly and experienced in their field of work.



I had been reminded that teamwork can be a huge advantage when tackling difficult projects. As an intern, I had the opportunity to learn and expand my knowledge on the subject of Distributed Control Systems, Mechanical applications such as MothBalling, and also, on creating 2-D and 3-D designs in the SolidWorks platform. Since the beginning, I was supported by the administration as they allowed me to be a part of their project meetings so that I could gain knowledge and experience on how different engineering projects were planned and organized. Therefore, the experience that I have gained from the Practicum has given me an insight into how engineers work on their projects and collaborate with others in a corporate environment which can serve as a guide for me to grow as an engineer.

## Chapter 3

### Narrative Essay

The Internship was intended to understand the operations of Almeer Saudi Technical Services Co. and attain skills that are necessary to become a better engineer. Almeer Saudi is a subcontractor of Saudi Aramco and performs many projects at sites





such as at the Abqaiq Oil plant, which is the largest oil plant in the world and at the Jubail Industrial City, which is the largest Industrial City in the world. Their operations are based on GOSP(Gas Oil Separation Plant) Plant Maintenance, on Plant Shutdowns, on DCS(Distributed Control System) Maintenance and much more. I was assigned as an intern who observed the project phases of an ongoing DCS project involving the upgrade of the I/O cards of a DCS system under the DCS project engineers Eng.Syed Junaid Al Hassani and Eng. Sarvanand. I have also observed the engineering drawings of the DCS systems with the project scope and also, the process instruments used in the DCS project. I was taught how a project scope should be read by an engineer by analyzing the tasks that are highlighted with the inclusion of engineering drawings. I was also trained on how to use the SolidWorks software to create 2-D and 3-D engineering drawings and models.

In the beginning, I was introduced to the three engineering project planning phases including Engineering, Procurement, and Construction by my trainer Eng. Junaid Al Hassani. For the Engineering phase, important tasks including creating an engineering drawing of the area in focus, finding sustainable solutions to the engineering application and more steps related to project planning are performed. This would normally take around a year as it takes time to get accurate engineering drawings and also, the appropriate solutions. For the Procurement phase, important resources are allocated from the inventory or purchased for the project. Proper budgeting with the focus on maintaining profitability and sustainability while also acquiring the essential supplies is the key to success for this phase. For the construction phase, the manpower and the



required equipment is deployed to the site, and the tasks that are mentioned in the project scope are performed. The activities in each phase are planned and cost beforehand by the contractor and are submitted to the project owner in a bid to get the project rewarded by that project owner. At Almeer, I was introduced to the Primavera software by my trainer Eng. Junaid Al Hassani where he showed me how he planned the different stages of engineering project planning including Engineering, Procurement, and Construction for his previous projects. Primavera was used for assigning tasks like delivering construction supplies from one place to the other. The duration and the manpower were also assigned for each task which became a part of the main project. I was also shown the Gantt charts of different projects that can be displayed in the Primavera software. Another benefit of using this software includes estimating costs for the activities associated with the project daily and also, adding general rates such as the cost of a Nitrogen(N<sub>2</sub>) gas cylinder which is used for a lot of mechanical applications. By following the three-phase approach towards engineering projects and by using Primavera, project planning becomes easier and practical.

It is really important to understand the project scope which is provided by the entity that assigns the job which in this case Saudi Aramco. While the tasks that are laid out in the scope are straightforward, it is important to identify the location areas by scoping and also, the importance of noting who is supplying what aspect of the project. My first project scope reading was for a DCS System that needed to be upgraded at the Abqaiq oil plant. The DCS project is based at the Abqaiq Oil Plant that includes



DCS(Distributed Control System), VMS(Vibration Monitoring System), CCS(Compressor Control System), and ESD(Emergency Shutdown) Systems for controlling the separation of millions of barrels of crude oil. There are 2 DCS projects that Almeer has been associated with since March 2018. The first project involved upgrading DCS systems'(Distributed Control Systems) I/O(Input/Output) cards at the Abqaiq plant that was completed in early 2019 and for the second project, a project bid has been submitted. The first project was awarded by Saudi Aramco to Almeer Saudi Technical Services in collaboration with Emerson Electric Co. where Almeer had been assigned to perform the DCS hardware upgrades and Emerson has been assigned to provide the upgraded DCS hardware with its software program. The parameters that were measured in this project included the pressure, volume, and temperature of the crude oil extracted. The vibration and the flow rate of the crude oil in the pipes were also measured.

During the training, I had witnessed that the company had a corporate license for SolidWorks with free training to use the SolidWorks software. I had asked my trainer if I can take the training to build 2-D and 3-D engineering drawings within the software which he gladly agreed on. As I started the SolidWorks training sessions, I would spend half of my day at the job undergoing these training sessions where I learned how to make 2-D and 3-D designs in SolidWorks. I learned how to use different tools within the software including the rectangular tool, the arc tool, and more for making 2-D sketches. For 3-D modeling, I learned how to use the boss extrusion tool and the cut extrusion



tools. The boss extrusion tool can cause a base to extrude out of it's the 2-D frame to form a 3-D object while a cut extrusion tool can be used to cut the extrusion of a 3-D object or to make an object 2-D again. Apart from the 3-D modeling of the DCS system, I was given a task by my trainer to design a 2-D engineering drawing for an ongoing electrical project. I was tasked to make an electrical diagram for an E&I(Electrical & Instrumentation) upgrade project that consisted of a manual changeover switch that switched power from one source to another for Almeer's Jubail's workshop. The two sources consist of power feeding from the Saudi Electrical Company(SECO) and a Diesel Generator. The changeover switch switches the power from one source to the other if one of the sources is not supplying power. The power is feeding into a separate line and a transformer for amplifying and dividing the current into three supply lines. This drawing was made as a guide for this project as a Diesel Generator was added as a second source of electricity for this workshop.

During this training, I was also introduced to the concepts of MothBalling and Re-Validation by Eng. Mujeeb who is a Mechanical Engineer at Almeer Saudi.

MothBalling and Re-Validation are applied for performing Hydraulic tests on gas and oil pipes performed at Aramco gas plants. These procedures are industrially followed to test if there are any leakages in the pipes that are used when pumping out oil and gas from gas or oil wells to gas and oil separation plants(GOSPs). MothBalling consists of 9 steps and the Revalidation procedure consists of the first 8 steps in MothBalling. The steps include dropping or separating the spool from the pipeline, blinding the ends with blind flange,



scraping of dirt within the pipe with a scrapper, pumping in water, measuring if the desired pressure is achieved, dewatering the pipe, scrapping again to remove unwanted dirt boxing up or attaching the spool back to the main pipeline, adding nitrogen gas(N<sub>2</sub>) to purify the pipeline with an inert gas. When removing the spool, a part of the complete pipeline is removed by removing the flanges on both sides that separate that spool from the oil/gas wells and the GOSP manifold. Blind flanges are placed on both ends of the wells to block any leakages from both ends. If no leakages are detected in the pipe during the test, the pipe can securely be used in the main channel of the GOSP. To grow my understanding of MothBalling and Re-Validation that occurs in pipelines, I started designing a 3D model of Flang that was connected to a pipeline in SolidWorks. By developing this model, I was able to visualize an important and crucial part of the procedure involved in MothBalling and Revalidation where the pipe is tested with one end of that pipe blocked by a blind flange.

For a company's long term sustainability, It is very important to have an organized platform for storing corporate data including the company's assets. Thus, the concept of Enterprise Resource Planning(ERP) was introduced to me by Eng. Junaid as I observed the preparation of the asset and inventory lists for transfer to the ePROMIS software platform. The idea behind it was for giving the employees better accessibility to the company asset and inventory as those employees planned for their respective projects. If an engineer were to a lot a certain item from the inventory list for his project, he would need to get approval from the project manager first which happens digitally as the project



manager is notified about the request for allocation by the engineer within the software platform. The actions can be taken much quicker by using the digital platform with the engineer getting approval while keeping the project manager informed. The project inventory list is also updated and can be viewed by the system admin regularly. Thus, using Enterprise Resource Planning(ERP) software greatly helps a corporate company in managing that company's inventory and assets while maintaining a seamless process for gathering the essential resources needed for ongoing projects. Almeer's transition to ePromis is expected to happen in the summer as the company finalizes its inventory and asset list.

As an intern, I had the opportunity to learn and expand my knowledge on the subject of Distributed Control Systems, Mechanical applications including MothBalling, and also, on creating 2-D and 3-D designs in the SolidWorks platform. Since the beginning, I was supported by the staff at Almeer as they allowed me to be a part of their project meetings to gain knowledge and experience on how different engineering projects were planned and organized. Thus, the experience that I have gained from the training has given me an insight into how engineers work on their projects and collaborate with others in a corporate environment which can serve as my guide to grow as an engineer.

## Chapter 4

### WBL Practical Assessment



(Attached Separately)

**4.1 Student's Practical Questionnaire**

**4.2 Trainer's Practical Questionnaire**

**4.3 Advisor's Practical Questionnaire**

## References

Shepherd, R. (2016). ALMEER TECHNICAL SERVICES CO. W.L.L. - ppt video online download. Retrieved April 20, 2020, from <https://slideplayer.com/slide/10150935/>

“Total Solution Provider”. (n.d.). Retrieved April 21, 2020, from <https://www.almeer-saudi.com/>



International University BAHRAIN

Salmabad, Kingdom of Bahrain