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IMPROVING PROJECT QUALITY, BUDGETING AND SAFETY MANAGEMENT OF COATING PROCESSES IN OIL AND CHEMICAL COMPANIES

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ABSTRACT

This project analyses problems that occur in coating project management in oil and chemical companies. This research investigates several issues that cause the coating to not last long,high-budget project management costs, and job and safety environment analysis. This study presentscoating work process recommendations on how the coating project management should be measuredand assessed for creating a better coating. The successful completion of the inner tank cleaning and pipe coating project demonstrated the service company's expertise for oil and chemical companies in surface preparation and protective coatings in challenging environments. This case study underscores the importance of rigorous planning, regulatory compliance, and commitment to safetyand environmental responsibilities in the field of inner tank cleaning and pipe coating work.

1. Introduction

In this increasingly advanced civilization, there is a lot of development that is huge. Construction was carried out in all aspects, starting from the building supports to the building itself. In the oil and chemical industry, many aspects need to be considered to support operational activities, one of which is pipes. This is done to improve operational activities so that it becomes very beneficial for its activities.

Project management is the planning, arrangement and implementation of resources ranging from people, materials, and equipment, so that technical activities, budgeting, time and place of a project can be carriedout. Project management is also an effort to build an integrated management system for all work to achieveoptimal and structured coordination so that good management is achieved[1].

In the course of a project, benchmarks for project success are often associated with project failure in the form of incomplete planning, poor quality of work, and many activities that are inefficient for the project and cause project costs to balloon, making it inefficiently with the existing budget. It can be concluded thatthe success of project work can be measured by planning, quality, budget, resources and time factors.

This research aims to improve project management with a better coating process, according to a more efficient cost budget and providing quality pipe coating so that it is long-lasting and does not damage the quality of chemical oil which is a commodity in this field. oil and chemical industry.

The discussion regarding the process carried out in coating pipes in the oil and chemical industry is the stage of cleaning the surface of the pipe itself, then there is also the process of roughing the surface, and finally, the application of the coating itself which consists of 2 layers to coat pipes in industry oil and chemicals. There is a comparison of affordable prices compared to previous cleaning of chemical tanks andpipe coating so that this research supports improving project management, budgeting and safety

management for the coating process.

2. Literature Review

Coating companies are a field of research and practical that is focused on developing company accommodation in the field of health and safety environments based on views, concepts, tools and researchmethodologies to create good coatings. In a coating company, work is carried out in the form of structured project management based on budgeting, workmanship concepts and quality determination, as well as health management. Table 1 shows a Comparison Study of Project Management and Coating Projects.

Table 1. Comparison Study of Project Management and Coating Projects

No	Year	Author	Title	Respondent	Conclusion
1	1988	Pinto, J.K. and Slevin, D.P. [2]	Critical Success Factors in Effective Project Implementation. In: Cleland, D.I. and King, W.R., Eds., Project Management Handbook, 2nd Edition, Van Nostrand Reinhold, New York, 902-909.	Research shows the importance of having clear project goals and scope. A clear understanding of the project objectives is essential for planning and implementation effective. Overall, this study highlights the importance of effective project management by taking into account the key success factors mentioned above. Understanding and integrating these factors in planning and Project implementation can increase the chances of success in implementing project organization.	In this research, the relevance of the references taken is the definition of clear objectives and scope for project work in research. With this aim and scope, it can be used as a reference for this work project so that this project has certain methods to achieve the final project results.
2	1988	Marshall E. Parker. and Edward G. Peattie. [3]	Pipeline Corrosion and Cathodic Protection: A Practical Manual for Corrosion Engineers, technicians, and field personnel 3rd Edition.	The properties of the pipe, starting from the material, work process, and durability, are all explained in detail, including the rust process that occurs in the pipe and cathodic protection to prevent rust. Treatment methods are explained to save maintenance costs pipe.	In this research, the connection with the reference used is as a reference for getting a good coating in the form of a coating to protect certain materials.

No	Year	Author	Title	Respodent	Conclusion

3	2001	Freeman, R.E. dan J. McVea. [4]	A Stakeholder Approach to Strategic Management.	Overall, this article calls on companies to adopt a more holistic and sustainable approach to their management, in which stakeholders have a significant role. By taking into account the interests of all parties involved, companies can achieve long-term sustainability and create greater value for the community and surrounding environment. This management approach focuses on stakeholders.	In this research, the connection with the references used is the importance of the approach Management with stakeholders who invite companies to achieve long-term sustainability and good value for the company and the surrounding environment.
4	2008	Reza Javaherdashti [5]	Tank Cleaning Guide.	The tank cleaning guide is an important reference for professional contractors for these practitioners. It provides the entire cleaning guide of each tank frame, thereby achieving the success of the cleaning project tank.	In this research, the reference used is a reference to guide tank cleaning in terms of stages and techniques that must be considered in this tank cleaning project.
5	2012	Raymond F. Wegman and James P. Kelsey. [6]	Surface Preparation Techniques for Adhesive Bonding.	In this book, the information that every given is comprehensive for applying coatings as coatings for certain materials. The techniques that need to be considered and certain conditions are explained in detail for coating.	In this research, the connection with the reference used is as a reference for getting a good coating in the form of a coating to protect certain materials.
6	2017	Project Management Institute [7]	A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Sixth Edition	This book, provides a comprehensive guide to managing projects effectively, with an emphasis on stakeholders, continuous improvement continuity, and deep flexibility in practical application project management.	In this research, the relationship with the references used is as a reference to guide project management in the form of stages and techniques that are useful for achieving successful project goals.

No	Year	Author	Title	Respondent	Conclusion

7	2017	Kerzner, H. [8]	Project Management Metrics, KPIs, and Dashboards: A Guide to Measuring and Monitoring Project Performance. Hoboken, NJ: John Wiley & Sons.	Effective communication within project teams with stakeholders is a recurring theme. Research emphasizes the role of communication in reducing misunderstandings and increasing collaboration. Overall, this book provides a comprehensive guide on how to measure and monitor project performance. This helps project professionals and stakeholders to be more effective in their project management, ensuring that the projects achieve their stated goals and deliver value to the organization.	In this research, connection with the references taken is the key to effective and clear communication. By providing clear communication, this project is very necessary and requires references in certain stages and techniques to obtain good and effective communication.
8	2022	Harold Kerzner [9]	Project Management: A Systems Approach to Planning, Scheduling, and Controlling.	Project management systems for engineering approaches, planning, scheduling and settings are an important reference for project management. It provides system upgrades and project management.	In this research, the relationship with the references used is as a reference for system management in project management, to achieve successful project goals.

3. Research Methodology

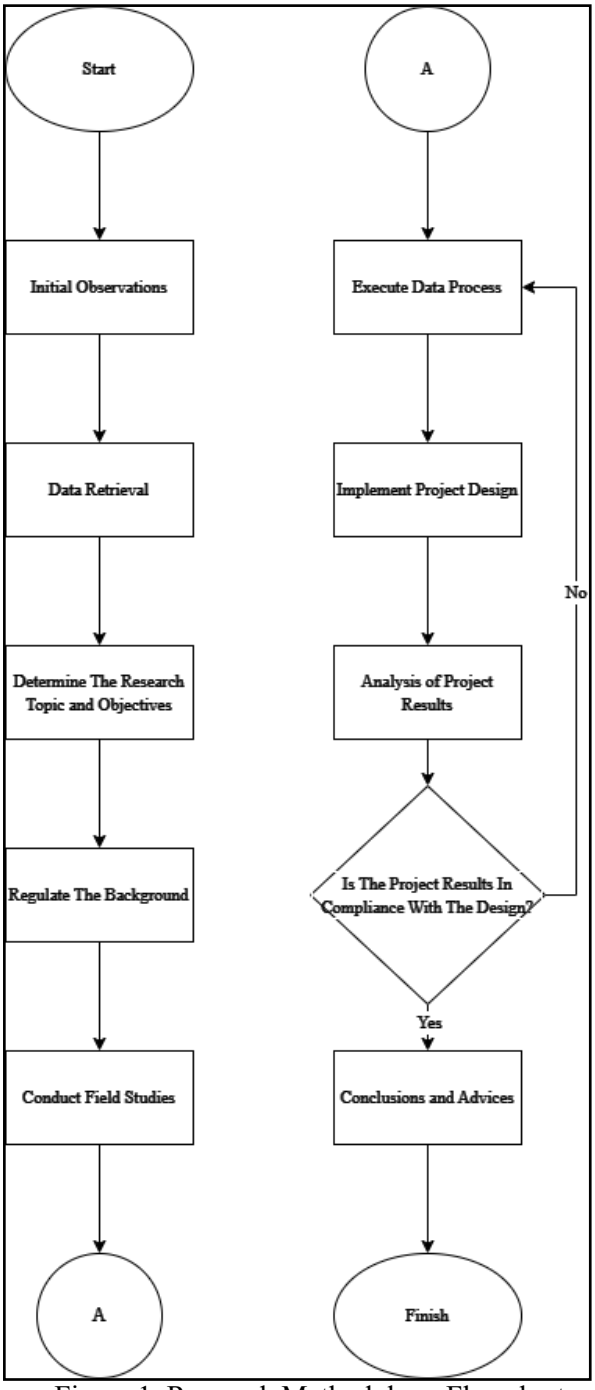

Figure 1. Research Methodology Flowchart

The following is an explanation of the research methodology flowchart:

1. Initial observations
The first stage is initial observation of the project activities you want to carry out.

2. Data Retrieval
After making initial observations, the next stage is to collect data to carry out the project.

3. Determine the research topic and objectives

After collecting data, you can determine the research topic and objectives.

4. Regulate the background
After determining the research topic and objectives, you can formulate a background to explain the researchtopic being studied.

5. Conduct field studies
Field studies as consideration for carrying out projects. To carry out field studies, appropriate literature is needed.

6. Execute Data Process
Next, carry out data processing analysis, especially in the field Work Safety and Environmental Budgetingand Analysis.

7. Implement project plan
Coating project plan application to improve project management coating services for chemical Companies.

8. Analysis of project results
Analyzing the results of coating projects that have been applied.

9. Make decisions
Are the analysis results of the coating project that has been implemented in accordance with the plan?

10. Conclusion and advices
The final stage is conclusions and suggestions on the research.

Research Design for cleaning and coating work project management uses experiments and case studies asan applicable case in chemical companies, especially for cleaning and coating work are as follows:
Site assessment, Regulatory compliance, Surface preparation, Coating application, Quality control, SafetyMeasures, Project Completion.

4. Data Collection and Calculation

4.1. Inner Tank Cleaning Work

The following inner tank cleaning process for chemical companies consists of the component Area Measurement, Tool Mobilization, Opening Manhole Tank Process, Blower Installation, Cleaning Process,Inspection Process, Demobilization Process, and Closing Manhole Tank Process which are described in Figure 2

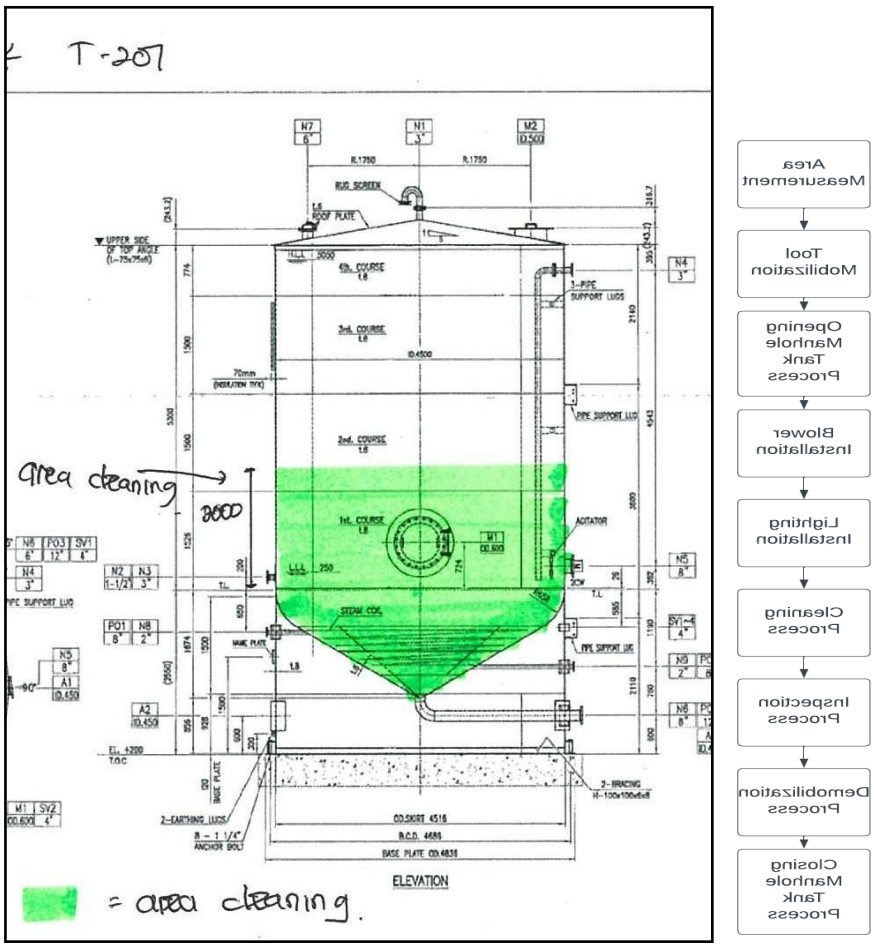

Figure 2. Description of Inner Tank

4.2. Job Safety and Environment Analysis on Inner Tank Cleaning Work

Job Safety and Environment Analysis on cleaning work is very necessary to evaluate potential risks and dangers that may arise during cleaning tasks in the inner tank [10][11]. This involves identifying potentialhazards to employee health and safety, as well as potential adverse impacts on the environment. Analysis usually includes a step-by-step examination of job components, equipment, procedures, and the work environment.

The Job Safety and Environment Analysis on inner tank cleaning work is below in figure 3:

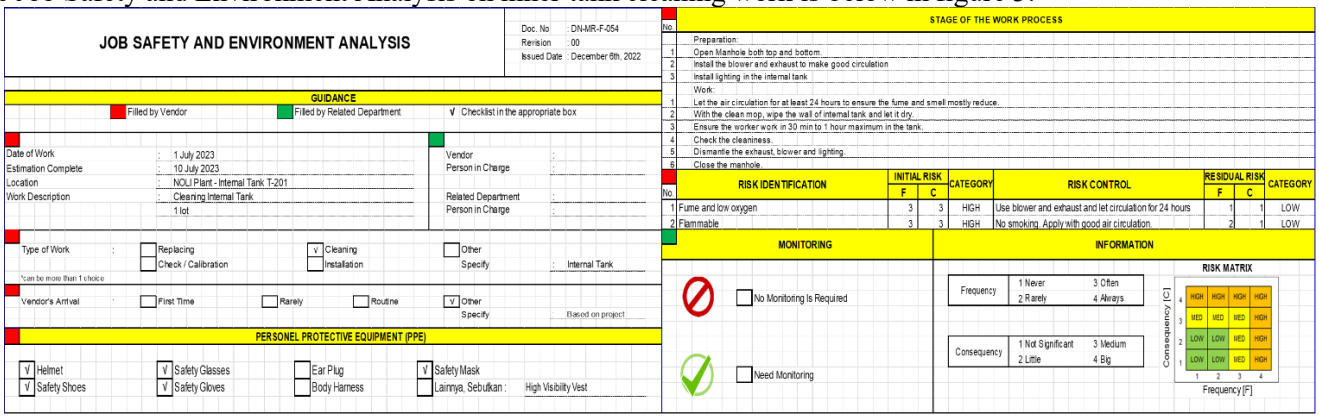

Figure 3. Job Safety and Environment Analysis On Inner Tank Cleaning Work

The work process begins with opening the bottom and top manholes followed by installing an exhaust system to improve air circulation in the tank. This is done 24 hours before the cleaning job. The lighting, bottom cover and parts of the scaffolding were prepared the following day to keep the bottom from

being contaminated by dirt that fell during the cleaning process. The condition of the inner tank is in Figure 4.

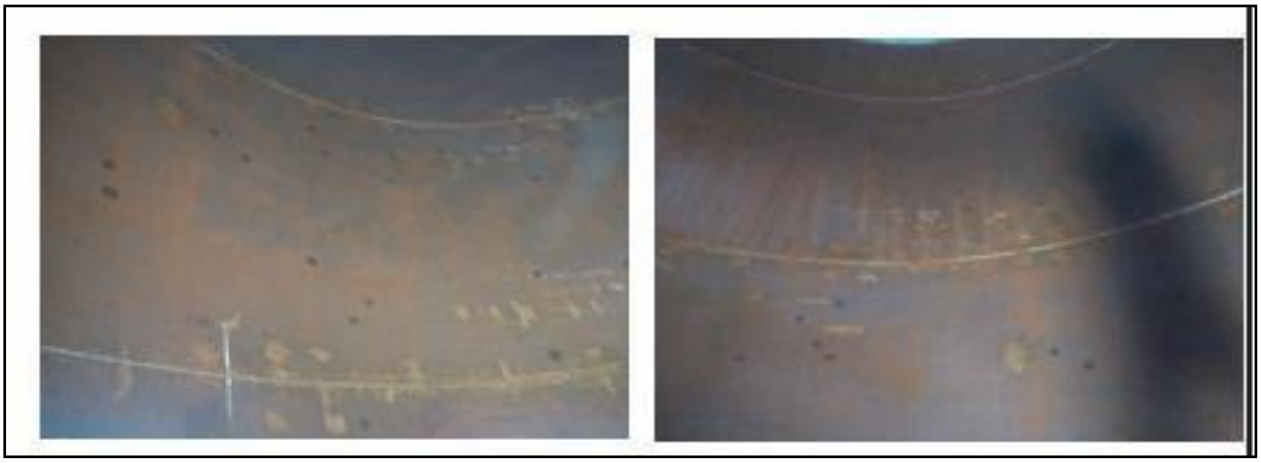

Figure 4. Inner tank condition

Installing an exhaust system to make good air circulation. This circulation process is carried out 24 hoursbefore the work process begins and during work. During the work process, the replacement of workersin the tank is also carried out periodically. The blower installation is in Figure 5.

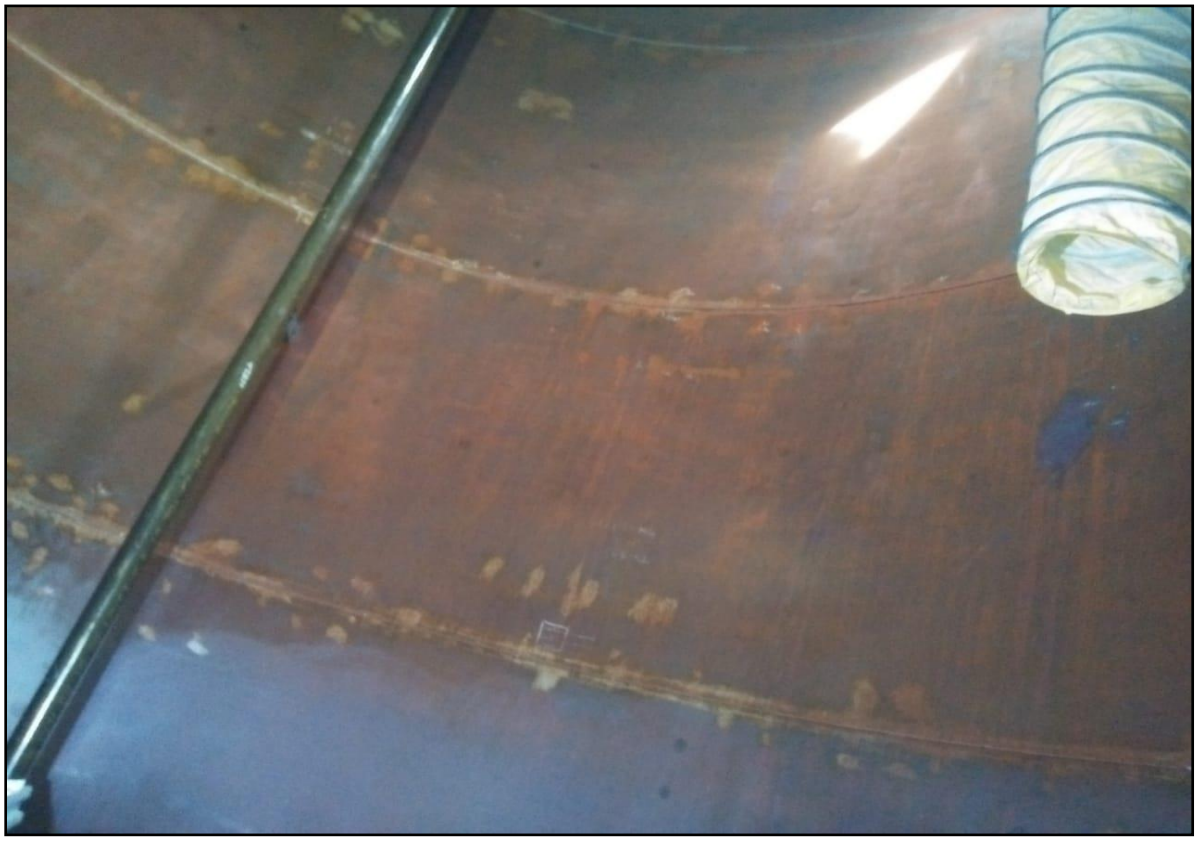

Figure 5. Blower Installation

The cleaning process is carried out using a cloth/absorbent cloth which will absorb dirt, remaining oil, rust and other contaminants. This cleaning process is carried out in stages starting from the walls and done to the bottom of the tank. The cleaning process is carried out repeatedly until a clean surface is obtained. Inspections are carried out together with related parties to ensure the work has been carried out properly. The cleaning process is in figure 6 and the inspection process is in figure 7.

Figure 6. Cleaning process

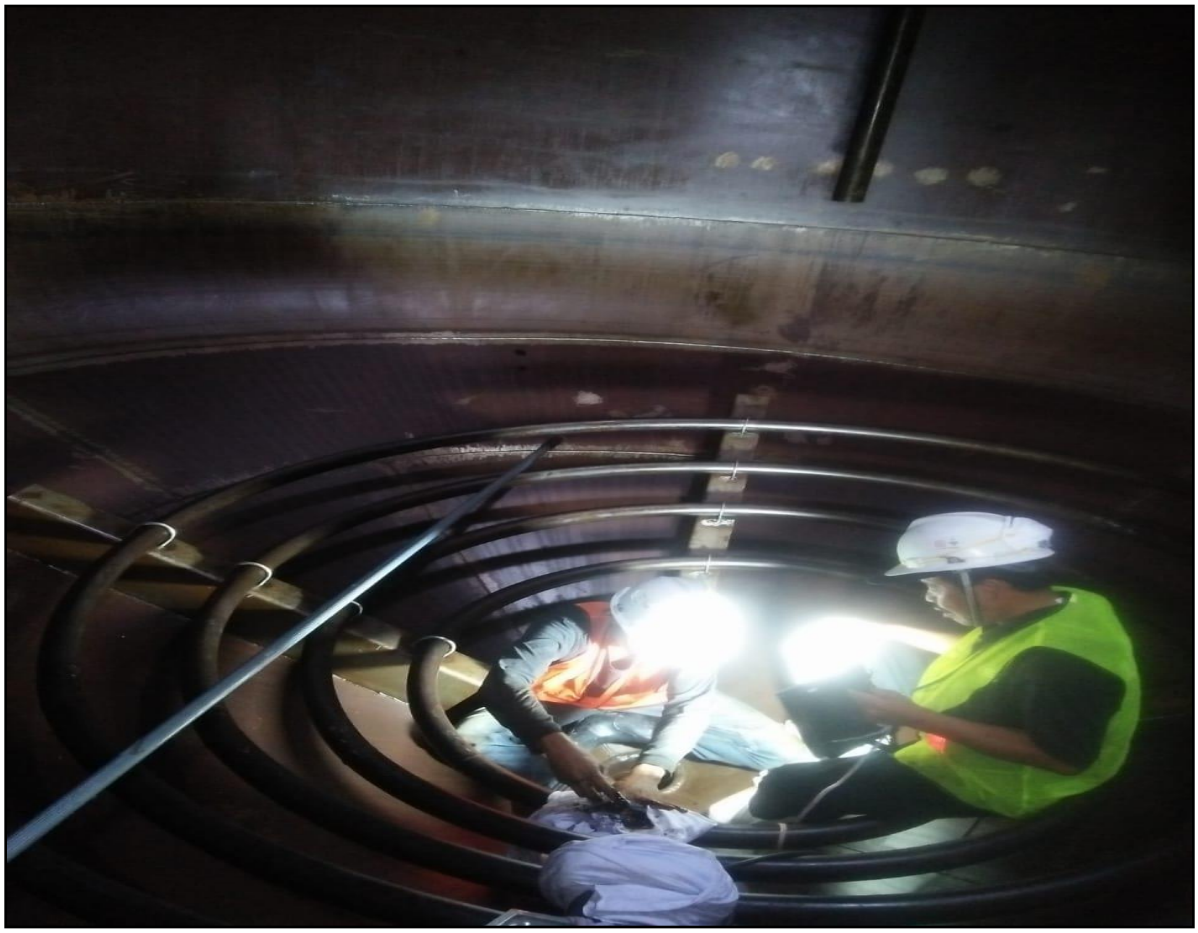

Figure 7. Inspection process

The results of cleaning can be seen from the remaining contaminants attached to the surface of the ragsor absorbent. The cloth marked with a red circle is the cloth used for the first cleaning process. It can be seen in figure 8 that many contaminants can be removed in this cleaning process and the result for inner tank cleaning in figure 9.

Figure 8. Cloth for inner tank cleaning

Figure 9. Cleaning Result

5. Budgeting

Budgeting involves the process of estimating, allocating, and controlling the financial resources required toplan, execute, and complete a project successfully. It is a critical aspect of project management because it helps ensure that a project is completed within its financial constraints while meeting its objectives.
The Budgeting on inner tank cleaning work is below in table 2:

Table 2. Inner tank cleaning work budget

No	Product	Price
1	Preparation and mobilization	$357.57
2	Exhaust installation	$557.48
3	Scaffolding installation	$492.47
4	Cleaning process	$1,332.75
5	Demobolization process	$185.29
	Total	**$2,925.56**

The Budgeting on pipe coating work is below in table 3:

Table 3. Pipe coating work budget

Material	Thickness	Usage	Price/litre	Price	meter^2	Total
Alkyd Zinc Rich Primer	0.10mm	0.2 litre	$13.00	$2.60	$794.00	$2,064.40
Alkyd Finish	0.25mm	0.3 litre	$16.25	$4.88	$794.00	$3,870.75
Preparation and Application Costs				$6.50	$794.00	$5,161.00
						$11.096.15

The previous Budgeting on inner tank cleaning work for the price reference is below in table 4

Table 4. Previous inner tank cleaning work budget

No	Product	Price
1	Preparation and mobilization	$1,109.23
2	Cleaning process	$1,689.44
3	Demobolization process	$219.29
	Total	**$3,017.96**

The previous Budgeting on pipe coating work for the price reference is below in table 5:

Table 5. Pipe coating work budget

Material	Thickness	Usage	Price/litre	Price	meter^2	Total
Synthetic Enamel	0.8mm	1.1 litre	$6.23	$6.853	$794.00	$5,441.282
Preparation and Application Costs				$9.20	$794.00	$7,304.80
						$12.746,082

It is essential to assess financial to constructing good quality to the coating processes for budgeting method. Ultimately, the effectiveness of a budgeting method often depends on project objectives. Therefore, it couldbe shown a budgeting comparison for tank cleaning and pipe coating between the previous and the present.The Budgeting Comparison on inner tank cleaning and pipe coating work are below in table 6:

Table 6. Budgeting Comparison between the previous budget and the present budget on inner tankcleaning and pipe coating work

No	Previous budgeting	Present budgeting
1	$3,017.96	$2,925.56
2	$12.746,082	$11.096.15
Total	**$15,764.042**	**$14,021.71**

The comparison price of the oil and chemical tank cleaning project between the previous and the present with a quite significant difference is about $1,742,332, regardless of the difference in the quality of the previous coating which is much worse. The present coating uses 2 layers to protect the pipe from corrosion,so it can be ensured that present management of the tank cleaning and pipe coating project is completed successfully with a strength of over 7 years.

6. Project Timeline

A project timeline, often referred to as a project schedule. It outlines when each task or activity is planned to start and finish, providing a clear overview of the project's progression from initiation to completion. The project timeline and its key components are as follows: Tasks, Start dates, End dates, Duration.

The project timeline on inner tank cleaning work and pipe coating work are below in table 4:

Table 4. Project timeline on inner tank cleaning work and pipe coating work

Project Work	Start Dates	End Dates	Duration
Inner tank cleaning work	1 July 2023	10 July 2023	9 days of work
Pipe coating work	3 July 2023	17 July 2023	14 days of work

7. Conclusion

The successful completion of the inner tank cleaning and pipe coating project demonstrated the service company's expertise for chemical companies in surface preparation and protective coatings in challengingenvironments.

This case study underscores the importance of rigorous planning, regulatory compliance, and commitmentto safety and environmental responsibilities in the field of inner tank cleaning and pipe coating work.

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