



Ashkam Energy Pvt. Ltd.



INTERNSHIP REPORT 2025



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Acknowledgement:

We would like to express our heartfelt gratitude to all those who supported and guided us during the course of our internship.

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We would also like to thank the team at Ashkam Energy Pvt. Ltd. for creating a professional and collaborative environment that enriched our learning experience and allowed us to apply our technical skills to a real-world engineering challenge.

Additionally, We would like to acknowledge our college for issuing the No Objection Certificate (NOC) which enabled us to pursue this internship opportunity.

Lastly, we are grateful to our family and friends for their continuous support and motivation throughout this internship.

Abstract:

This report outlines the work completed during our internship, which commenced on 15th May 2025, at Ashkam Energy Pvt. Ltd. The primary objective of the internship was to develop a software solution for simulating pipeline crossings, a common engineering challenge in infrastructure development.

During the internship, We worked on the design and implementation of a desktop application named "Pipeline Crossing Simulation", using PyQt5 for the graphical user interface and Python for the backend logic. The software allows users to input pipeline and soil parameters to simulate and analyze different crossing scenarios. Our responsibilities included creating an intuitive GUI, coding the simulation logic based on engineering principles, and integrating both components into a functional tool.

This experience provided us with hands-on exposure to real-world software development, enhanced our proficiency in Python and PyQt5, and deepened our understanding of structural engineering concepts related to pipeline installation. The internship has not only strengthened our technical capabilities but also improved my problem-solving, time management, and collaborative skills.

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INTRODUCTION

Pipeline crossings, particularly those beneath roads and railways, require careful analysis to ensure safety, structural stability, and long-term performance. These crossings are subjected to various external and internal loads, including earth pressure, live loads from traffic, internal pressurization, and thermal effects. Traditional methods of analyzing such conditions often involve manual calculations, which can be time-consuming and prone to errors. Automating these calculations through software not only improves efficiency but also reduces the risk of design flaws.

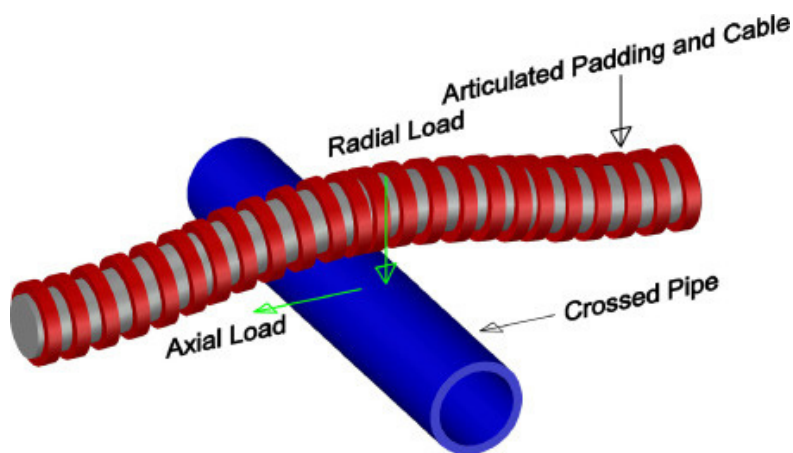


Fig.1.1

This application is designed to assist engineers in evaluating the mechanical behavior of pipelines under a range of operational and environmental conditions. It enables users to simulate the effects of different load scenarios and assess key stress parameters to determine the structural safety of pipeline installations.

The software was developed using **Python** for its strong scientific computing capabilities, and **PyQt5**, a powerful GUI toolkit, for creating a user-friendly interface. The UI design was visually constructed using Qt Designer, allowing for a clean and interactive user experience.



Fig 1.2

To facilitate teamwork and version control, we used **Git**, a distributed version control system, along with **GitHub**, a cloud-based platform for hosting code repositories. A shared repository was created by my project guide, which allowed us to collaboratively develop the application. We regularly used Git commands to push and pull code changes, enabling seamless coordination and real-time updates between design and logic development. This approach ensured code integrity, allowed us to track revisions, and greatly improved our development workflow.



Fig 1.3

The core functionality of the software includes the calculation of:

- Barlow stress due to internal pressure
- Circumferential stress from earth loads
- Cyclic stresses from surface traffic
- Thermal stresses due to temperature variations
- Effective (principal) stress analysis for safety checks
- Fatigue verification of girth and longitudinal welds

By combining engineering principles with modern programming tools and collaborative development practices, this project demonstrates how simulation software can significantly enhance the accuracy and efficiency of pipeline crossing design.



Organization Profile

ASHKAM ENERGY PVT LTD is a distinguished and rapidly evolving multi-disciplinary engineering consultancy firm that commenced its operations in 2015. Founded by a collective of passionate engineers and seasoned professionals, the company was established with the ambitious objective of contributing to the "Make in India" initiative through the provision of Global Energy Consultancy services. The foundational vision, mission, and values instilled by its founders have been instrumental in transforming ASHKAM ENERGY into a progressively dynamic entity within the engineering consultancy landscape.

The company's extensive service portfolio encompasses a broad spectrum of critical engineering disciplines. This includes active involvement in Marine Engineering, Naval Architecture, Process Engineering, Structural Engineering, Civil Engineering, Mechanical Engineering, and Piping Engineering, catering to diverse industrial needs. ASHKAM ENERGY's specialized expertise is particularly prominent in areas such as comprehensive Ship Design, advanced Offshore Engineering solutions, intricate Mooring Design, and the design of Critical Equipment.

Beyond these core areas, ASHKAM ENERGY also provides specialized services in Subsea Pipeline & Marine Engineering. They offer invaluable Advisory services to the burgeoning Oil & Gas industry, and are actively engaged in the design and development of LNG & Re-gasification Terminals. Their capabilities further extend to crucial infrastructure projects like Port & Harbour development, and they play a significant role in the rapidly expanding sector of Renewable Energy. Complementing their consultancy services, ASHKAM ENERGY also provides end-to-end EPC (Engineering, Procurement, and Construction) Services, offering integrated solutions from conceptualization to execution for complex projects.



Internship Roles & Responsibilities

During our internship at ASHKAM ENERGY PVT LTD, our primary responsibility was to contribute to the development of a specialized software application named 'Pipeline Crossing Simulation'.

This project was integral to providing advanced engineering solutions within the company's domain.

Our role encompassed both frontend and backend development aspects of this software:

Frontend GUI Development: We were responsible for designing and implementing the user interface (GUI) for the 'Pipeline Crossing Simulation' software. This involved utilizing PyQt, a robust framework for creating desktop applications, to ensure an intuitive and functional user experience.

Backend Logic and Calculation Implementation: Concurrently, We were tasked with developing the backend logic and integrating the necessary engineering calculations for the simulation. This involved translating theoretical concepts and formulas into functional code to ensure the accuracy and reliability of the simulation results. Our work on the backend involved applying principles of engineering and simulation to process inputs, perform calculations, and generate clear results based on specified conditions.

Through this project, we gained hands-on experience in full-stack development within an engineering context, bridging the gap between theoretical calculations and practical software application.



Work Done & Achievements

During our internship, a significant achievement was the successful development of the 'Pipeline Crossing Simulation' software, encompassing both its graphical user interface (GUI) and backend computational logic. This project directly contributed to ASHKAM ENERGY PVT LTD's engineering capabilities by providing a specialized tool for critical simulations.

Our key contributions and the specific work done include:

- **Front-End GUI Development (using Qt Designer and PyQt):**

- We designed and implemented the interactive user interface, which included creating the main window, input fields for various parameters, display areas for results, and control buttons essential for running the simulation.
- We developed a dedicated loading screen module (loading.py) to provide user feedback during calculation processes, enhancing the software's user experience by indicating active computation. This screen visually communicates that the application is processing data, preventing user uncertainty.
- We utilized Qt Designer to visually construct the GUI layouts and elements, and then integrated these designs into the Python application using PyQt, ensuring seamless interaction between the user interface and the backend logic. The conversion of .ui files to .py was a routine part of this process.

- **Backend Logic and Calculation Implementation (using Python Programming):**

- We were responsible for translating complex engineering theories and formulas into executable Python code for the 'Pipeline Crossing Simulation'. This involved implementing the theoretical overview of all inputs and outputs, as well as the formulas used for calculations specific to pipeline crossing scenarios.
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- Our work ensured a clear explanation of results based on conditions, providing accurate and reliable simulation outcomes.
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- This involved extensive Python programming to handle data processing, apply algorithms based on engineering principles, and manage the flow of information between the GUI and the computational core.

- **Version Control and Collaborative Development (using Git & GitHub):**

- We actively participated in collaborative development using Git and GitHub. Our team utilized a shared repository managed by our guide, where we consistently performed pull operations to retrieve the latest changes and push operations to contribute my updates.
- This disciplined approach to version control ensured effective teamwork, allowed for continuous integration of code, and enabled our guide to efficiently track the progress and contributions of the team.

Conceptual Design (using Canva):

- Before implementing the GUI, Canva was used for designing blueprints of the frontend GUI, helping to visualize and plan the user interface layout and flow. This preliminary design phase was crucial for establishing the structure and aesthetics of the application's user-facing components.

Through these efforts, We successfully contributed to delivering a functional 'Pipeline Crossing Simulation' software, demonstrating proficiency in software development, engineering calculations, and collaborative project management.

