Engineering Excellence.
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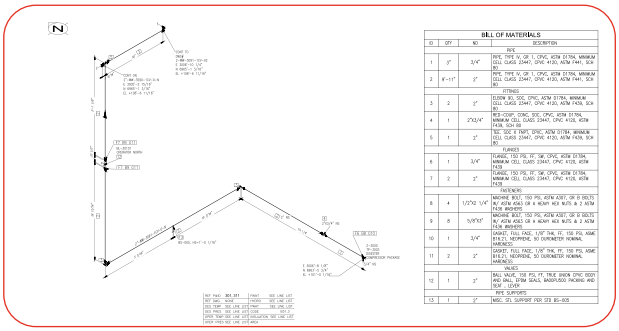
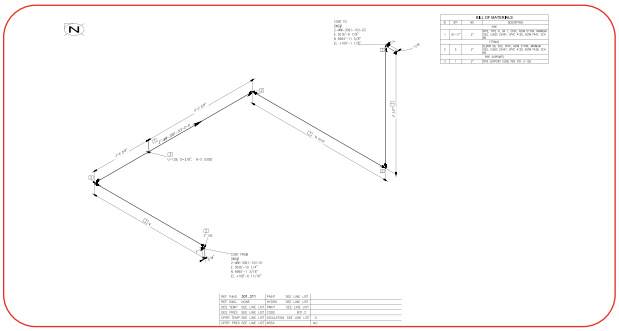
Conveying Success – one pipe at a time

Type of Project	Client Industry	Location	Project Duration	Tools Used
RNG Plant Piping Design and Isometric Extraction	**EPC**	**USA**	**45** days	Autoplant 3D+CAESER II+AutoCAD

Project Profile	Team details
EPC for RNG Plant	Project Lead: **12** Yrs | Piping Analysis Lead: **14** Yrs | Piping Designers: **4** to **6** Yrs Analysis team: **5** to **7** Yrs | Structural Designer: **10** Yrs





This customer was an engineering services contractor named among the top 400 contractors by Engineering News Record (ENR). With prolific experience across the Americas and South East Asia, spanning front-end engineering design, turnkey engineering, Procurement and Construction (EPC) for oil and gas, and petrochemical facilities, and chemical plants, they had built a reputation for quality, ingenuity and innovation.

The project in question was for a Renewable Gas Plant that was in the process of recommissioning three unused digesters to generate and upgrade biogas to that of pipeline quality transportation fuel. The task at hand was three-pronged.

- Implementation of Hydrogen Sulfide (H2S) removal systems for each of the three digesters
- Implementation of piping to allow the three digesters to pump partially upgraded biogas to the Central Processing Facility
- Integrating the fully upgraded biogas into the grid after Carbon Dioxide (CO2) removal

The project comprised over 200 lines amounting to 500 piping Isometrics coming from the digesters and the Central Processing Facility. The considerations for each included Insulation, Heat Tracing Requirements, Pipe Support Standards, and Piping Specification among a host of other standards and specifications. The margin for error was nonexistent, and there was yet another delivery risk on the horizon. Winters were particularly harsh in the geography and could delay the project significantly if the execution was not swift and perfect. The customer approached Enventure at this point, requiring a 60 Business days project to be completed within 45 business days.

Enventure Approach

Enventure began by holding detailed discussions with the customer during which:

The plot plans and existing building information was captured over multiple site visits and surveys

Estimations for each of the tasks were performed and validated with the customer to reduce rework and improve the delivery timeframe

Selected a 15-member task force for this project and created a framework for the team to begin analyzing the project and providing their feedback and ideas to improve project delivery

Enventure utilized its experience with plant engineering to lay out a step-delay approach to the project, allowing design, stress analysis, and reviews to happen in a sequential orchestration. Given the importance of a quick turnaround, a two-shift team was put in place, where the second shift would begin with evaluations with the customer. Taking advantage of the time-zone difference, the Enventure teams were able to perform the rerouting and rework tasks and ready them for review before the beginning of the next US day.

Developing piping designs from scratch for every project can be cumbersome. Hence, the teams at Enventure have created a library of reusable design components that speed up the process. Additionally, at the beginning of the project, the most frequently reused design components were identified and templatized, speeding the process even further.

Project/Solution Overview

The team started by creating the structural and foundational designs for the different equipment and skids for each of the sites incorporating the building details and the sizes of the different concrete structures and structural members. Concurrently, the piping team began laying the pipes into the design routing them in AutoCAD Plant3D. Aligning the pipes to the requirements, while considering the maintenance and access considerations as well as the building specifications was crucial for a smooth execution – a necessity, given the rough weather heading the customer's way.

Staging reviews at the 60% and 90% marks allowed for assessment of the designs against the customer specifications, prevent clashes and most importantly delays in delivery.

Once the piping models were finalized and extracted, the Material Take Off (MTO) was generated for the procurement of material and the required fabrication to be executed.

Simultaneously the analysis team performed the pipe stress analysis, prioritizing Cat-2 and Cat-3 stress classes and validating them with the customer. Parallel processing of the stress analysis in a one-step delay with the piping design allowed for routing and changes to be completed swiftly, without affecting the overall delivery timeframe.

Customer benefits

The customer was able to complete the project execution on-time and before the onset of winter. Some of the most crucial contributors to this were:

- Completed the entire design and delivery within 45 days, for a project with an industry-standard delivery timeframe of over 60 Business days
- Despite three major changes in the design, the step-delay processing and the two-shift cyclical approach allowed for a zero-delay delivery
- As many as 438 isometrics were delivered after extensive stress analysis with zero defects,
- Enventure's Project Management approach allowed the customer to see real-time progress on the project, reducing the need for audits and huddles, also improving the trust factor
- Enventure's Quality Oversight processes and validation checklists proved to be crucial in a number of situations, where the project would otherwise have seen defects and delays

Summary

On time-sensitive and business-critical projects, outsourcing is usually seen as a risky bargain. With this customer as with many others, there was an element of surprise at the precision, consistency, and methodical approach with which the project was executed. As is the case with every project, Enventure was accurate in its emphasis on the four key success factors:

- Requirements analysis and estimation
- Project management and processes
- Quality oversight and checklists
- Wireframing and Automation

In our experience spanning almost a quarter of a century, this four-fold path has been crucial in allowing us to **build lasting relationships** with **our customers** on the basis of **quality, efficiency, and trust.**

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