

Construction Management of Chimney Using Primavera P6

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ABSTRACT Building an industrial chimney is a difficult undertaking that requires careful scheduling and resource management. This project investigates how project management software Primavera P6 can transform these initiatives to directly address this difficulty. We'll be cutting expenses, maximizing material efficiency, and refining project schedules. The project hopes to achieve these objectives to greatly increase efficiency and bring in a new age of success in industrial chimney construction. The potential advantages of this initiative go well beyond it; for example, it may be possible to develop a useful manual for project managers and improve procedures all over the construction sector.

Keywords: Chimney, Primavera P6, Work Breakdown Structure (WBS), Planning, Scheduling, Project Management, Resource Allocation.

1. INTRODUCTION

Primavera streamlines planning and scheduling for precise resource allocation, work sequencing, and milestone identification, optimizing resource usage and reducing waste to save costs while maintaining quality. Its advanced scheduling features enhance time management through critical path optimization and work parallelization, crucial for RCC chimney construction. With robust risk management tools, Primavera helps project teams identify and mitigate potential risks, ensuring efficient project execution and resilience against delays and cost overruns. Its collaborative platform fosters sharing of information and decision-making among stakeholders, driving team efforts toward project success. Primavera's scalable and customizable features make it suitable for projects of all sizes, adapting to unique requirements and changing conditions. Notably, Primavera significantly improved the Vijayawada Thermal Power Plant Chimney project in India by enhancing scheduling, resource allocation, and stakeholder coordination, ensuring timely completion and quality standards. Compared to The Gammon Company's traditional methods, our customized solution using Primavera offers superior efficiency, cost reduction, and risk management, revolutionizing chimney construction management. Hesham A. Abdel-Khaleka et.al [1] Oracle Primavera Contract Management (PCM) which is a web-based

involve determining quantities of ingredients by program includes many features such as document management, cost control, field monitoring and time management. In addition to that, it decreases time schedule delays which provide visibility in the contract performance by providing a central repository for data on the turn-around time of a given process. Pankaj D. Varsani et.al [2] It's critical to schedule and plan properly in construction projects for reducing and controlling delays in the project, With the use of project planning software, the time and amount of paperwork associated with preparing such projects can be greatly decreased. This study's primary goals are to use Primavera P6 software to plan, schedule, and monitor an industrial project and analyze the outcomes. Nensi kumari V. Desai et al [3] application of Primavera P6 and Microsoft Project (MSP) for project handling and management. The costing and scheduling of the project were calculated by using primavera P6 and Microsoft Project. Each software possesses several unique qualities for many kinds of project management-related tasks. This research aims to highlight the positive insights of both tools for the projects. Vignesh V [4] Resources are needed to complete certain tasks in a project, yet there are never enough of them inside a given company. The project manager may decide to schedule some tasks in parallel while creating the schedule structure. In these circumstances, it is plausible that the same resource is being utilized for both of the concurrent processes, even when its

availability is limited. Akshay R. Kohli [5] The primary objective of this paper is to understand the principles of planning, scheduling, resource allocation and levelling along with efficient project management of a construction building. The step-by-step methodology to undertake a project has been explained and the ultimate usage of Primavera P6 Enterprise Project Portfolio Management (EPPM) has been summarized. Ravish Kumar et.al [6] In today's construction project management, many mathematical tools and techniques such as bar charts, CPM, PERT and so on are employed for project planning. To manage the multi-tasking and complicated building environment, other standalone computer software and web-based packages are also in use. This paper aims to investigate advancements in construction management When working with exceedingly complex building procedures in a complex environment.

2. INTRODUCTION TO PRIMAVERA P6 PROFESSIONAL

Primavera launched in 1983 by Primavera Systems Inc., was acquired by the Oracle Corporation in 2008. The software includes management of any project, control and collaboration capabilities and effectively integrates with other enterprise software such as Oracle and SAP's ERP systems. One of the most effective, reliable, and user-friendly tools for organizing, administering, and carrying out projects, programs, and portfolios on a worldwide scale is Primavera. With P6, you can manage projects of any scale with a single solution that can adjust to different project complexity levels and manage intelligently to satisfy the needs of all roles, functions, or skill levels of any organization's project team. Primavera P6 Enterprise Project Portfolio Management (EPPM) can function as a planning, scheduling, budget and resource management software that enables organizations to make informed decisions and improve their ability to deliver projects on time and under allocated budget. It also helps to monitor IT Process, determines the estimate completion of telecommunication projects, risk analysis in aerospace engineering and enables precise control in the manufacturing processes. As a result, the scope of Primavera is an ever-changing, ever-growing tool for simplifying the completion of all projects-oriented tasks and

activities.

3. ACTIVITIES OF CONSTRUCTION OF RCC CHIMNEY

- **Earthwork In Excavation and Backfilling:** This phase involved setting out, clearing, grubbing, excavation in various soil conditions, dewatering, disposal of surplus material, and backfilling up to the slip-forming level, ensuring precise execution.
- **Slipform Fabrication & Erection:** Slipform Fabrication & Erection was critical for constructing the chimney shell. It began with slipform checks, followed by concreting at various heights, fabrication and erection of internal structural platforms, steel flue can fabrication, girder beam erection, and installation of external platforms, handrails, and brackets for worker safety and structural stability.
- **Hood Slab:** The hood slab installation required careful dismantling and lowering of the slipform, painting the outer surface, applying insulation for thermal protection, and erecting the steel flue can with precise alignment for proper ventilation, ensuring quality and adherence to engineering standards.
- **Painting of Outside:** The chimney's exterior was painted with specialized coatings for durability and aesthetic enhancement, along with insulation and erection work, contributing to the structure's integrity and longevity.
- **Aviation Warning Lights, Earthing, Lightning Protection Systems, and Other Electrical:** This phase focused on installing aviation warning lights for aircraft safety, earthing systems to disperse electrical currents, lightning protection systems to shield from lightning strikes, and other electrical components, making sure safety rules are followed and operational functionality.
- **Finishing, Clearance, and Other Works:** The final phase included site clearance, fabrication and erection of staircases, expansion compensation measures, flue duct support installation, and completion of remaining structural works, emphasizing quality assurance and readiness for handover.

4. METHODOLOGY

Data Collection

Analysing And Studying Of Data Collected

Collection of information of scheduling of chimney from the company

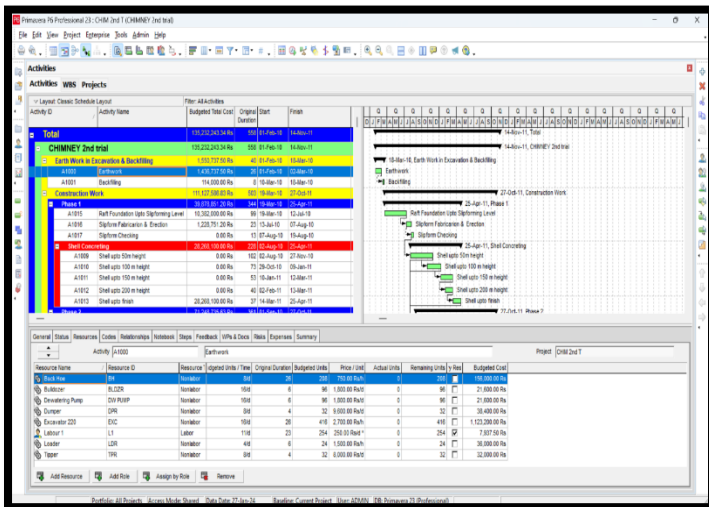
Learning the Primavera P6 software

Application Of Primavera P6 for Construction Management

Comparison between the trials

Selection of the effective trial

Results



5. EVALUATION OF THE PROJECT OUTCOMES

The project outcomes represent a significant achievement in meeting our objectives and exceeding expectations. Through the meticulous implementation of Primavera software and strategic construction management techniques, we successfully realized substantial reductions in both time and cost. The primary objective of the project was to optimize the construction process of the chimney while ensuring timely completion and cost-effectiveness. The data-driven approach enabled us to accurately assess resource allocation, streamline workflows, and identify

critical paths for efficient project execution. The achieved reduction of 34 days in the project timeline and a cost-saving of 5 crore rupees not only demonstrate the effectiveness of our methodologies but also highlight our ability to deliver tangible results. By surpassing the initial targets set forth by Gammon India Ltd., we have not only met but exceeded the project's objectives, underscoring our capability to drive efficiency and deliver value in construction management endeavors.”

Description	Cost (Rs.)
Material	46.771
Resources + Others	64.49
Other	33.86
Contingency	14.330
NET COST	161.217

Particulars	%	Cost (Rs)
Resources	16.49	26.504
Material	35.59	57.20
Water and Electricity	6	9.64
Labor Accommodation	3.5	5.63
Safety and Emergency	2	3.21
Contractors Profit	10	16.07
Inventory Management	3.50	5.63
Organizational Charges	21.90	35.20
Other Expenses	0.010	1.63
TOTAL	100	160.731

6. RESULT

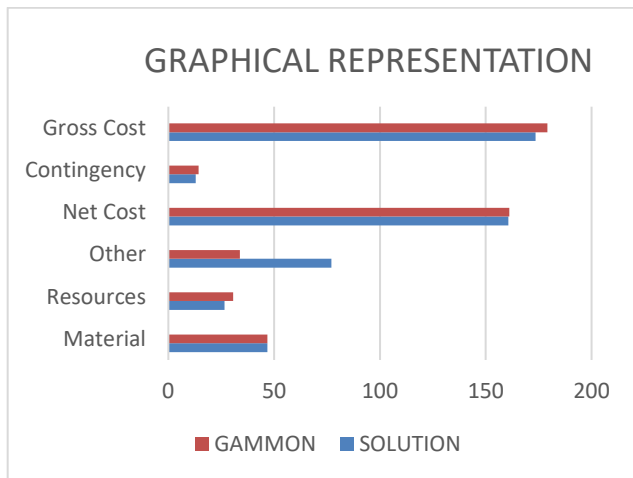
The total cost using traditional methods is ₹179,130cr, while the cost using Primavera P6 is ₹173,590cr. This represents a cost saving of ₹5,540cr (or 3.1%) by using Primavera P6. Primavera P6 appears to offer some cost benefits in construction projects, but it is important to consider other factors such as the time to complete the project, the complexity of the project, and the expertise of the construction team.

- Material costs are the highest cost component for both the common solution and the Gammon solution, accounting for 35.59% and 46.71% of the gross cost,

respectively.

- Resource costs are lower for the solution than Gammon, at 16.49% compared to 19%.
- Other The price is much lower for the solution than for Gammon, at 47.92% compared to 61.09%.
- The net cost is slightly lower for the solution than for Gammon at ₹160,731 compared to ₹161,217.
- Contingency costs are lower for solution than for Gammon, at 8% compared to 11%.

	GAMMON	SOLUTION
Description	Cost (Rs)	Cost (Rs)
Material	46.77	46.77
Resources	30.63	26.504
Other	33.83	77.02
Net Cost	161.127	160.731
Contingency	14.33	12.86
Gross Cost	179.130	173.59



7. VALIDATION

1. Material Costs:

The common solution has lower material costs compared to the Gammon solution, accounting for 35.59% and 46.71% of the gross cost, respectively. This aligns with the notion that efficient project management tools like Primavera P6 can help optimize material usage and procurement, leading to cost savings.

2. Resource Costs:

The solution has lower resource costs compared to Gammon, at 16.49% compared to 19%. This suggests that using Primavera P6 may result in more efficient allocation and utilization of

resources, contributing to overall cost savings.

3. Other Costs:

Other costs are significantly lower for the solution than for Gammon, at 47.92% compared to 61.09%. This suggests that there are various miscellaneous costs involved in construction projects where Primavera P6 helps in reducing expenses.

4. Net Cost:

The net cost is slightly lower for the solution than for Gammon, at ₹160,731 compared to ₹161,217. This validates that the overall cost savings are indeed realized when using Primavera P6.

5. Contingency Costs:

Contingency costs are lower for the solution than for Gammon, at 8% compared to 11%. This suggests that the enhanced project management capabilities provided by Primavera P6 may lead to better risk assessment and management, resulting in lower contingency costs.

6. Gross Cost:

The gross cost is lower for the solution than for Gammon at ₹173,590 compared to ₹179,130. This confirms that Primavera P6 contributes to ₹179,130. This confirms that Primavera P6 contributes to reducing the overall project costs.

8. RECOMMENDATIONS

- Implement standardized project templates and workflows within Primavera P6 to streamline project planning and execution processes.
- Utilize Primavera P6's Earned Value Management (EVM) functionality to monitor project performance against predefined metrics and assess project progress accurately.
- Integrate Primavera P6 with Building Information Modeling (BIM) software to facilitate seamless data exchange and improve collaboration among project stakeholders.
- Leverage Primavera P6's reporting and analytics capabilities to generate actionable insights and inform data-driven decision-making throughout the project lifecycle.

9. CONCLUSION

The software facilitates task sequencing, critical path analysis, and resource optimization, ensuring that the construction process is well planned and efficiently executed. The software fosters a collaborative planning environment, enhancing team coordination and overall project success. By integrating advanced project management tools, the software contributes to a well-organized, collaborative, and efficient construction process, ultimately leading to successful project outcomes. Conducting a trial with Primavera P6 allows for a thorough evaluation of its capabilities in diverse project scenarios. The selection of the optimum trial provides valuable insights into the software's effectiveness, enabling organizations to make informed decisions for enhanced project management. Leveraging Primavera P6 ensures an optimal fit for project requirements, leading to improved efficiency and successful project outcomes.

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