Andeavor Proves the Value of Advanced Work Packaging on Refinery Upgrade

ConstructSim’s Automated Process Increased Time on Tools to Over 40%

Reducing Sulfur Content with Clean Products Upgrade

Andeavor is installing a new isomerization unit and naphtha hydrotreating (NHT) reactor at its Anacortes refinery, as part of its three-phase Clean Products Upgrade Project (CPUP). This typical refinery upgrade project will reduce sulfur content and efficiently deliver clean transportation fuels. For this brownfield capital project, Andeavor chose to pilot the implementation of a corporate-wide, advanced work packaging solution to create more efficient, cost-effective execution strategies for its capital projects.

The Clean Products Upgrade Project will expand the NHT reactor to process 46,000 barrels of naphtha per day and execute the installation of a new isomerization unit to increase the amount of octane available in the refiner. The project will also include installing underground pipes, earthworks, and foundations, as well as nine modules fabricated overseas and all interconnecting and tie-in components.

Meeting Standards to Benefit the Company and Local Community

Founded in 1968, Andeavor is a highly integrated marketing, logistics, and refining company that operates in 18 states in the United States. With more than 14,000 employees, the company has over 7,500 miles of pipeline and operates 10 refineries with a combined capacity of about 1.2 million barrels per day in the mid-continent and western United States. Andeavor works to create a safer and cleaner future with reliable transportation fuel solutions.

The Andeavor refinery has been operating in Anacortes, Washington for about 83 years. The upgrade to the Anacortes refinery is needed to meet new Federal Tier 3 standards to reduce sulfur content and efficiently deliver cleaner transportation fuels. The Andeavor project team faced many challenges traditionally encountered while attempting to execute successful capital projects. The team members chose this typical refinery upgrade project to pilot advanced work packaging processes with a goal to reduce cost overruns, maintain the schedule, and eliminate potential claims situations. The use of advanced work packaging would not only benefit Andeavor, but it would also allow the organization’s contractors to be more successful by utilizing these strategies for their individual subcontracts. If successful, the organization would see greater alignment and better working relationships on future projects. The project would also act as the development ground for the eventual rollout of advanced work packaging across all Andeavor projects.

Andeavor worked with Bentley, and TeamBuilder Solutions (TBS) as subject matter experts, to integrate advanced work packaging processes into the project. TBS helped integrate the advanced work packaging process, ensuring the application of best practices and aligning construction execution procedures and project execution plans throughout the lifecycle of the project. Together with Bentley and TBS, Andeavor carefully measured its return on investment and established best practices for its project teams and contractors to replicate this practice across other projects.

Ensuring Data Reliability and Sharing

Andeavor used ConstructSim and Navigator, combined with Bentley’s outcome-based processes according to advanced work packaging best practices, to ensure data reliability for project controls and transparency regarding installation work packages. ConstructSim enabled progress audits to help keep contractors focused on key deliverables and maintain schedule adherence.

The application could include all field-direct work, except scaffolding and minor support tasks, and contractors could only invoice based on the report. The team then verified all installation work packages against the quality verification documents, ensuring another layer of interdependency between the installation work packages and the quality turnover, and improving clarity and transparency.
Another benefit was that the Bentley applications helped the project team share information with team members. The team could take drawings and create posters to display on the walls of the three onsite trailers to provide updated information to the owner’s team, the contractor, and other team members and stakeholders. These poster updates were placed side-by-side, with the previous week’s version, to show the progress that had occurred. Key performance indicators (KPIs) for the project were published in the weekly report, and a copy of the KPIs was printed and placed on the wall of the trailer for easy reference. The five major KPIs included percent packaged, percent published, backlog, a three-week look-ahead readiness, and installation work packages duration in the field.

Improving Safety and Creating Best Practices

Overall, implementing advanced work packaging process enhancements using ConstructSim resulted in improved safety, measurement, communication, and productivity, while reducing project costs. According to TBS’s Douglas Hill, CEO and principal project consultant, “This project proved the value of advanced work packaging for supporting Andeavor’s desire to improve their capital projects program. Andeavor’s project management team embraced the best practice paired with a customized implementation process. Together with Bentley’s expertise in its solutions and education through the Construction Academy, the team was able to develop an approach that will enable them to replicate this success.”

Using the software to automatically create installation work packages took only three hours per installation work package, compared to 10 hours per installation work package when done manually, saving more than 1,000 resource planning hours. The time saved on planning also helped save on material handling and crew mobilization costs. The organization could recognize productivity gaps and develop trend analysis of the performance of the contractors. The use of automated installation work packages also helped provide a broad range of data over an extended period. Time-on-tools was specifically customized to support the project and allow for periodic review by multiple members of the owner team. The project measured time-on-tools at 40 percent, which is higher than the industry standard range of 34 percent to 37 percent.

Bentley’s applications also helped the team realize its lessons learned and realign its attitude toward advanced work packaging, resulting in a significant contribution to Andeavor’s best practices. It demonstrated an intent to perform continuous improvement and to drive that increase in maturity over the next few years. This drive is directly related to the success of the advanced work packaging program and ConstructSim on this project. Bentley will continue to provide training on advanced work packaging fundamentals to all project personnel and has provided training to selected contractors as part of the CPUP project.

Achieving Alignment Across the Organization

Bentley applications allowed Andeavor to achieve overall alignment of its project siloes in a construction execution-led strategy. The efficiencies gained on the CPUP project will establish a common platform to eliminate the training and retraining of partners for future projects. This uniformity will help streamline Andeavor’s future work and ensure the continued viability of an important local employer and contributor to the community.