CASE STUDY

ECO FOX improves refinery production efficiency and operations with Octave solutions

Key facts:

Company: ECO FOX

Website: www.ecofox.it

Industry: Chemicals & Petrochemicals

Country: Italy

Octave products used: Forte 3DWorx *(CADWorx Plant Professional),* Forte StructureWorx *(CADWorx Structure),* Forte ReviewWorx *(CADWorx Design Review),* Aspect Pipe Stress *(CAESAR II),* Aspect Pressure Vessel *(PV Elite),* Forte Isogen *(Isogen)*

ECO FOX is a leading company in the production and commercialization of biofuels. ECO FOX aims to reduce dependence on crude oil with the production of vegetable oils such as sunflower, soybean, canola, palm, biodiesel and, as a byproduct, crude glycerin. The company currently produces more than 200,000 tons of vegetable oils per year.

Identifying goals

To increase profitability, ECO FOX decided to improve its glycerin refining process in its existing refinery. To do this, several changes were required with regards to the existing plant's processes, equipment and overall layout. Rather than design, fabricate and install entirely new equipment from scratch, ECO FOX opted to purchase and install existing equipment from another plant located elsewhere in Italy. The project was awarded to OMA S.p.A., a leading Italian construction company.

Overcoming challenges

First, OMA conducted a constructability study to evaluate how to retrofit the purchased equipment into the existing facility, including the introduction of new structures needed to support the incoming equipment. The major challenge was mapping equipment inside the existing structure to ensure that any new piping routes and tie-ins needed for the new equipment were optimized and clash-free.

To meet the challenge, OMA chose Hexagon's design and analysis solutions to be used on the project.

Due to limited space at the Vasto facilities and the irregularity of the existing plant layout, as well as the inconsistency of current plant information or total absence of documentation, OMA proposed that ECO FOX use laser scanning technology to obtain an accurate 3D point cloud of the facility. By doing so, contractors could ensure that the new equipment, piping and structure would fit.

Realizing results

To accelerate the construction phase and enable ECO FOX to start production sooner, Forte 3DWorx was used to create a complete, accurate, intelligent, integrated 3D as-built and design model. This provided the basis for the constructability and interface studies. It also helped plan the dismantling of the existing plant and the construction sequence for the introduction of new plant items.

Key benefits:

- Accelerated plan for the construction phase
- Optimized production by minimizing rework
- Complete 3D as-built and design models
- Increased safety through accurate analysis

Using the as-built model and point cloud as the design basis, OMA was able to develop new piping designs easily and accurately using Forte 3DWorx. The purchased equipment was also scanned in the laydown area and modeled to provide 3D models that could be used during construction simulations.

Forte ReviewWorx was used to identify available space, optimize layout and determine if the purchased equipment would fit into the building. This also included evaluating whether or not the current structure would require changes to accommodate the additional weight of the new equipment. Several modifications were identified and Forte 3DWorx was used to design new structures and align the elevations of key supporting beams.

In total, OMA introduced 96 new pipelines and remodeled approximately 30 existing pipelines after checking for possible interference and available space. Forty pieces of new equipment were installed in a space of 175m2, with some existing equipment dismantled or relocated elsewhere in the plant. From the 3D model, Isogen was used to produce piping isometrics for fabrication; accurate bills of materials were produced for procurement and plot plans, piping layouts and 3D views were created for dismantling and construction. Aspect Pipe Stress was used to engineer and ensure stress-free and safe designs, which were produced for both the new piping and tie-ins made to existing lines.

For the new equipment, D-01 (a soda reactor) and F-01A/ B/C (active carbon filters), seismic behavior was analyzed. The new equipment models were designed using Aspect Pressure Vessel. Then, using its ability to share model data bi-directionally, the models were interfaced and updated with Forte 3DWorx, enabling the completion of piping connections to the equipment.

During the construction phase, problems occurred during piping installation, resulting in costly on-site rework being necessary. OMA's sub-supplier who had installed the equipment claimed that the deliverables produced from the 3D design model provided by OMA were incorrect. To remedy the situation, OMA laser scanned the positions of the new equipment, then, using Forte 3DWorx, overlaid the point cloud on top of the design model to check for any deviations. This approach proved that the subcontractor had inaccurately installed the equipment. The use of laser scanning in combination with Forte 3DWorx validated the work performed and avoided significant construction costs for OMA.

Moving forward

Overall, the project greatly benefited from implementing Hexagon's design and analysis tools, as seen in:

- Better decision making due to the merger of point clouds with 3D design and photo-realistic visualization
- Schedule acceleration due to more efficient work processes via intuitive, integrated and easy-to-use CAD and CAE tools

A key benefit for ECO FOX was the handover of intelligent engineering information and high-quality documentation, including isometrics, P&IDs, equipment details, general arrangements and layouts. The 3D model will provide an as-built design basis for future plant modifications. ECO FOX considers the project to have been a tremendous success and will mandate Octave's solutions to be used by other contractors on their future projects to deliver improvements to Vasto plant.

About Octave

Octave is a leader in enterprise software, turning data into decisive action and intelligence into your edge. Our software solves for and simplifies complexity, from the design and build to operations and protection of people, property and assets – for any scope, at any scale. For decades, we've partnered with customers to sharpen performance, elevate efficiency and amplify results. From factory floors to entire cities, our solutions are tuned to scale up what's possible from day one onward.