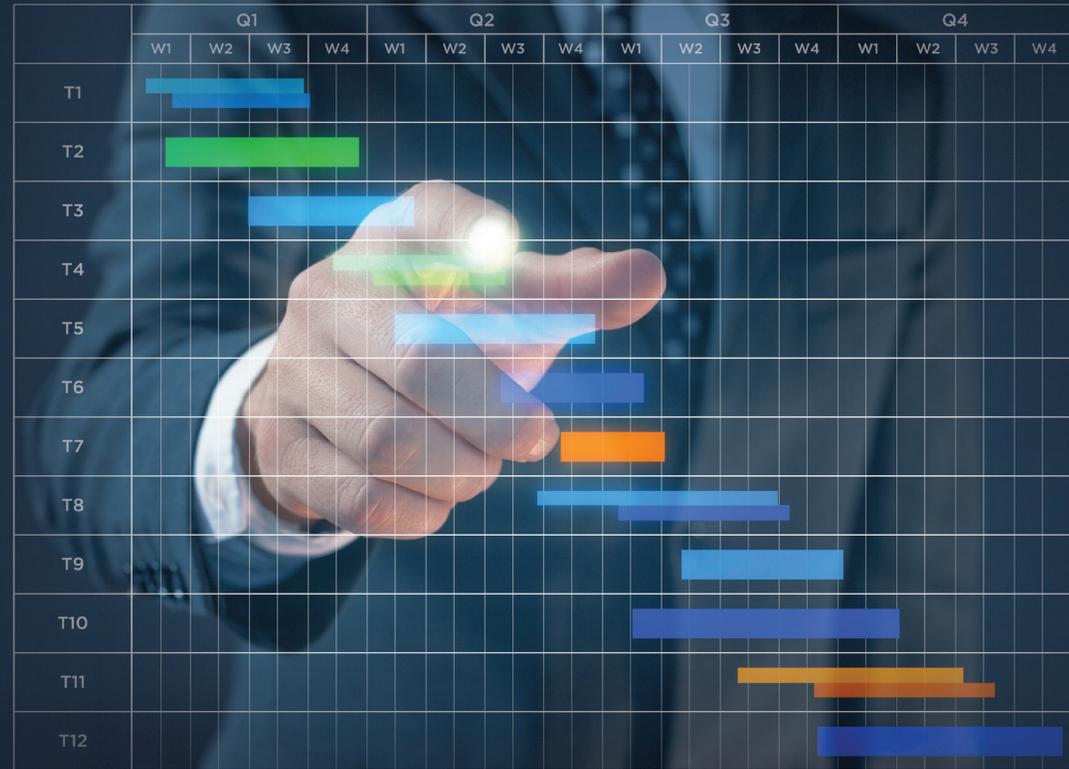**Marathon Petroleum Corporation Upgrades Refineries to Full Refinery Scheduling With Aspen Petroleum Scheduler™**

"Better inventory projections with Aspen Petroleum Scheduler helped us reduce the number of operational changes that were made by 70%."

- Paul Parrick, Lead Support Refining - Operations Research, Marathon Petroleum Corporation

CHALLENGE

Create a single "cradle-to-grave" barrel tracking system that would serve as "one version of the truth."

SOLUTION

Use Aspen Petroleum Scheduler (APS) to track every barrel in the refinery daily, with the capability for five to seven people to use the model simultaneously.

BENEFITS

- Removes the mystery around using custom scheduling spreadsheets

- Optimizes product schedules with respect to blend plans rather than market demands

- Easily identifies gaps between models and reality

- Drives greater confidence in turnaround planning and execution

Marathon Petroleum Corporation (MPC) is headquartered in Findlay, Ohio. The company has over 125 years of experience in the energy business, ranks 50 on the Fortune 500, is the third largest United States refiner based on crude oil refinery capacity and the largest Midwest refiner. MPC's refining, marketing and transportation operations concentrate primarily in the Midwest, Southeast, Northeast and Gulf Coast regions of the U.S.

Strategically located to serve major markets, MPC includes a seven-plant refinery network and a comprehensive terminal and transportation system. This system transfers feedstock among the refineries to optimize capacity and achieve economies of scale that reduce capital expenditures to improve efficiency (capacity is ~1.8 million bpcd and ~9.8% of the total U.S.). Recently, MPC underwent a corporate initiative to develop a single "cradle-to-grave" barrel tracking system that would serve as "one version of the truth" and eliminate many custom spreadsheets that posed significant challenges, such as being difficult to maintain and train new employees.

Full Refinery Scheduling With Aspen Petroleum Scheduler

Schedulers often spend more time with redundant data entry rather than analyzing the refinery schedule for opportunities to increase efficiency. With corporate support for initial model development, tools and training, MPC decided to embark on a project to develop a full refinery scheduling model using Aspen Petroleum Scheduler (APS) that would track every barrel through processing units and tankage, all the way through to the end product. These products include gasoline, distillate, LPG, resid, asphalt and specialties.

Before developing APS models for each site, MPC underwent an in-depth review to determine the necessary elements required for each scheduling model. Through their evaluation, it was determined that just because you could model something in APS, it didn't necessarily mean you should. Only essential model elements that were needed for day-to-day activities of a refinery were included in the final scheduling model.

The flexibility within APS enabled MPC to create interfaces and tools to streamline their scheduling workflow. As a result, they were able to minimize redundant data entry and accurately reconcile the model on a daily basis. These interfaces also aided schedulers to build events and import data, allowing more time to analyze the schedule. As many as five to seven people access the refinery scheduling model daily, including:

- Crude schedulers
- Feedstock/LPG schedulers
- Refinery Operations Coordinators (ROCs)

- Gasoline blenders
- Prompt month forecasters
- TAR planners

Once the models were built, MPC designated on-site resources to maintain the models and provide users with in-depth training. In some cases, re-alignment of duties to meet scheduling demands became necessary and provided a clear understanding of each scheduler's responsibilities. Additionally, on-site "super users" were developed to be the knowledge experts and first line of defense in maintaining the models and performing any necessary troubleshooting.

Business Benefits

Before APS, MPC used the last three to five days of history on inventory projections as the basis for future predictions, which proved to be a poor method. Once MPC started using APS, they could provide operations with better targets on unit rates, and reduce the number of operational changes that were made by 70%. This allowed the process units to spend more time on a stable operation.

Additionally, APS enabled MPC's refineries to:

- Optimize product schedules with respect to a blend plan rather than market demands
- Look outside the refinery fence by modeling pipelines for feedstocks, products and off-site terminals
- Spend more time on optimization and not inventory tracking
- Backfill vacation and cross-train easier
- Gain greater transparency and granularity — allowing more efficient scheduling of trucks and rails

APS has also helped MPC easily identify gaps between the model and reality — helping identify issues with submodels in Aspen PIMS™ from AspenTech, providing less assumptions and greater confidence in decision-making in both planning and scheduling. This full refinery scheduling solution presented new opportunities for improvements on numerous moving parts during turnaround planning and execution, making it easier than ever to resolve key issues with opportunities that include:

- Gasoline crack blowout
- Crude HEX chemical cleaning
- Gasoil synergy between multiple refineries
- Naphtha synergy between multiple refineries

Looking Ahead

MPC has gained efficiencies through increased collaboration and a streamlined scheduling workflow with the implementation of Aspen Petroleum Scheduler. The single "cradle-to-grave" barrel tracking system removed the mystery around using custom scheduling spreadsheets and enabled MPC to make less operational changes for more stable operations, spending more time at an optimized state. Due to the recent success, Aspen Petroleum Scheduler has been rolled out to the remaining MPC refineries.

Their next step is to link Aspen Refinery Multi-Blend Optimizer™ from AspenTech to Aspen Petroleum Scheduler to improve the accuracy of blending properties in the schedule. By linking these products, they will be able to pull gasoline component rundown rates from the plan. MPC continues to innovate and wants to explore additional modeling enhancements such as expanding the time window beyond two weeks, and expanding the modeling fence to include upstream and downstream terminals and crude optimization.

"Once the scheduling model is built, it is the BEST source of scheduling data available."

- Paul Parrick, Lead Support Refining - Operations Research, Marathon Petroleum Corporation

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