



WHITE PAPER

From scheduler to strategist: The next-generation technology shaking up refinery scheduling

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Executive summary:

In today's industrial workplaces, there are few things more frustrating than being hindered by tools that are unable to keep up with the speed or volume of data required to drive operational performance and achieve Environmental, Social, and Governance (ESG) targets. For refinery schedulers, a lack of access to connected digital tools is not only frustrating but can be a significant barrier to providing critical strategic insights. Next-generation scheduling technology is unlocking value by providing schedulers with the actionable insights they need to become strategic advisors, removing the barriers to schedulers becoming strategic advisors.

Introduction

The adage that a bad workman always blames their tools is becoming as outdated as the systems refinery schedulers currently use. In today's industrial workplaces, there are few things more frustrating than being hindered by tools that are unable to keep up with the speed or volume of data required to drive operational performance and achieve Environmental, Social, and Governance (ESG) targets.

For refinery schedulers, a lack of access to connected digital tools is not only frustrating but can be a significant barrier to providing critical strategic insights. In the high-pressure environment of scheduling, schedulers sit at the center of a very difficult world - tasked with balancing the requirements of planners with day-to-day real-world demands. Time wasted cross-checking data, manually running scenarios, and analyzing them can result in missing opportunities to deliver additional value to the business or, worse, lead to delayed actions that cost the business—with even just a few minutes' delay—millions of dollars.

New, cloud-enabled technology powered by computer learning and infused with industrial artificial intelligence is transforming the role of schedulers. Schedulers are evolving from being number crunchers to becoming valued strategic partners. Scheduling solutions, infused with artificial intelligence (AI), are eliminating the days spent running spreadsheet-based scenarios and delivering granular-level insight, with fully costed practical scenarios within minutes. With more time available and armed with complete scheduling oversight and analytics, schedulers can combine these insights with their deep knowledge to quickly identify an approach that will meet the refinery's operational and environmental targets.

This white paper explores how next-generation scheduling technology is unlocking value by providing schedulers with the real-time actionable insights they need to become strategic advisors, removing the barriers to schedulers becoming strategic advisors.

Overview

Scheduling is at the heart of successful refinery operations. The ability to translate monthly plans into feasible activity programs that meet commercial, environmental, and operational imperatives is no easy task. Decisions taken around liftings, reacting to unexpected delays or outages, or identifying the ultimate blend can directly impact top- and bottom-lines. Schedulers often struggle even to maintain operational feasibility, let alone optimize throughput, align with production plans, or meet environmental or emissions targets.

Because they must deliver an optimal value schedule under the constant risk of unplanned events, and with thousands of data points to track and scenario test, schedulers are under constant pressure.

While legacy software provides some support, this often takes the form of customized calculators, which allow the scheduler to change the timing or nature of an activity, such as the transfer of hydrocarbons from one tank to another, and to see the impact of that change. The difference legacy software makes to a scheduler's day-to-day role is minimal. Schedulers remain reliant on spreadsheets and spend days each month manually running scenarios. This often results in them keeping to tried-and-tested approaches, and potentially missing out on better options.

Next-generation scheduling tools are providing a step-change in approach. These new tools help to reduce the software burden on schedulers by offering a high-level, user-friendly scheduling environment, and defining schedules in terms of scheduling intent, rather than low-level activities. Schedulers are supported to go beyond just feasibility schedules, to align schedules with production plans and environmental targets by providing multiple, costed scenarios that enable schedulers to apply their expertise to make the final choice.

The technology allows enterprises to obtain consistency, transparency, and visibility in decision-making. It enables easy and confident sharing of feedstock information (underlying property data on individual assays and blends), planning decisions, potential schedules, process model updates, and pricing amongst other business-critical information.

Flexible and modern integration mechanisms make working with existing business systems and processes simple, with easy access to underlying feedstock information, while still retaining the security and versioning model used to ensure consistency between colleagues.

Schedulers can compare different timeframes and focus on the biggest differences with flexible aggregation of activities and inventories. Transfer qualities and constraints between the plan and the schedule are easily identified to aid operational planning and real-world reactions to market and plant changes.

Unlocking strategic insights with AI

The traditional approach to scheduling is highly repetitive and largely based on trial and error. Schedulers rely on little more than “sophisticated calculators” to develop and test scenarios. Not only is this time-consuming but it is also limited by the user’s capability.

New scheduling technology that is infused with AI is transforming the role of the refinery scheduler—helping them to develop an optimized schedule quickly and effectively. Freed from spending time compiling spreadsheets, schedulers can leverage actionable digital insights to complement their experience-based assumptions.

Through AI-infused software, schedulers can quickly run scenarios and identify the best approach for their refinery. What would have taken days of work can be completed in seconds with increased business agility and optimized decision-making. With built-in scenario planning and optimization, schedulers have almost instant access to the information they need to rapidly, and confidently, identify the right course of action.

Idemitsu Kosan introduced AVEVA Unified Supply Chain to develop planning and scheduling models for enhancing the decision-making process for higher refinery margins, optimizing refinery operations, and minimizing the cost of crude oil and transportation.

“We developed the software [in partnership with AVEVA] for practical use and put it into operation for actual inspection in a year. We are confident that this achievement will result in a new generation of schedulers that will significantly change the traditional concept of trial-and-error simulation-based scheduling. We look forward to initiating further developments that lead to great results.”

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Seiji Yoshii

Manager, System Development and Maintenance Section
No2 Information Systems Department, Idemitsu Kosan

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Achieve end-to-end plant scheduling

The technology provides end-to-end plant scheduling, including feed and blend optimization. The efficient and adaptive simulation engine can be integrated with other cloud-enabled supply chain management tools to allow real-time interactions with the schedule.

Every refinery has its own unique operating complexity and constraints. The latest scheduling technology automatically generates and evaluates multiple schedules in line with the objectives and anticipated events within the supply chain. Providing practical, actionable insights that can easily be explained and immediately implemented.

AI learns over time to recommend the best strategies so by continuously feeding in data, which means that less experienced team members can learn from the trends identified.

With machine learning, new scheduling solutions can take into account that every site is unique as well as the restraints of the refinery. By contextualizing data in this way, the platform will only produce scenarios that are relevant and actionable. This, combined with multiple, fully costed scenarios enables schedulers to do their job faster and more effectively.

Transparent visualizations, easy modeling, and enterprise sharing ensure ease of use, consistency in decision-making across planning teams, and clear communication to the wider business. Schedulers can more easily explain solutions and share insights with colleagues. Everyone is aligned around a single data stream removing barriers between different users and ensuring an individual's knowledge and experience are captured within the single supply chain mode.

AI-infused solutions are transforming refinery scheduling by:



Improving supply chain economics

Easy-to-configure functionality for process units, pipelines, and product blends allows users to quickly set up, adjust, and optimize single and multiple blend activities. Operations can be optimized across single and multiple timeframes. While economic and operation targeting ensures profitable and realizable schedules including composition tracking, running gauge, and recycles.



Promoting sustainability and safety

By synchronizing with other supply chain data in the cloud, schedulers can understand the impact different blends and stock feeds will have and enable them to identify the best approach to meet ESG targets. Unlike traditional scheduling calculators, AI-infused solutions provide only realistic options, so the risks of running a scenario where a tank might overflow for example are negligible.



Enabling collaboration

Multiple schedulers can adapt and update the same schedule together, reducing the time taken to produce an end-to-end schedule. Easy synchronization capabilities mean users can work together to form a comprehensive production schedule.



Increasing business agility

Analytics simplify complex workflows allowing setup, optimizations, and analysis within the solution. Built-in visualizations allow quick solution insights and easy identification of problems and opportunities. Users can run more scenarios, more quickly, and evaluate risks alongside traditional planning decision points.

Top scheduling risks.

1. Delays in discharging or fulfilling liftings via ship can cost as much as \$100,000 each time.
2. Supply disruption to the site. Schedulers must act quickly especially if other teams are impacted.
3. Unexpected outages at the site. It is critical the site returns to optimal operations quickly.
4. Traders or schedulers may be unable to capitalize on an opportunity if they spend time analyzing it with traditional methods.
5. With minimal automation, the risk of human error remains high at all stages of scheduling, from inputting and verifying data to missing issues during scenario analysis.

The solution: With intelligent scheduling software, refinery schedulers have access to trusted and practical, costed scenarios that reflect their specific refinery constraints and business priorities. With detailed end-to-end insights and highly visualized dashboards, schedulers can apply their own insights based on experience to identify the most feasible approach.

How AVEVA Schedule AI Assistant can help

AVEVA™ Schedule AI Assistant, part of AVEVA Unified Supply Chain, is an optimization and artificial intelligence (AI)-infused cloud-based solution. Designed to empower schedulers at refineries to explore and rank possible scenarios for efficiency, profitability, and emissions, the solution is a step-change for schedulers. It rapidly generates multiple optimized schedules that navigate days of schedulers' work in seconds. Schedulers' time is freed up to deliver a deep analytical review of the optimized scenarios and add strategic operational value.

The cloud-enabled solution blends AI, simulation, and optimization technology to transform scheduling, removing the reliance on enhanced calculators and trial and error to deliver proactive strategic scenario analysis.

About the author

Daniel C is a Senior Product Manager for AVEVA Unified Supply Chain. He is responsible for the vision, strategy and roadmap of AVEVA Unified Supply Chain and has been leading the transformation of our Scheduling capabilities.

To learn more about AVEVA Schedule AI Assistant, visit: [aveva.com](https://www.aveva.com)