

Unlock Critical Clues to Maximize Profitability in Refineries.

In this industrial game of Cluedo to maximize profits, refiners need to leverage the best innovation can offer. This is crucial in the volatile economy today, as profits can be razor thin. Owner operators need to adopt process simulation software to mitigate relentless business complexity – driven predominantly by accelerated globalization, increased market volatility and the latest legislation. To stay ahead of the competition, refineries need to achieve operational excellence in areas, such as operational troubleshooting, crude selection, refinery planning, profit margin analysis, turnaround planning and more. To embark on this journey, refiners need to unlock critical clues to profitability.

for process simulation and rigorous heat exchanger modeling, a seamless integration between the process simulator, heat exchanger design and rating tools is required. Process engineers can now effortlessly develop and integrate rigorous simulation of heat exchanger operation, as part of the refinery flowsheet. HPCL's refinery in Mumbai, India, has saved time and money (over \$250K annually), while improving their heat exchanger maintenance schedule. The INEOS refinery in Lavera, France, saved \$4 million annually by employing a heat exchanger fouling monitoring application.

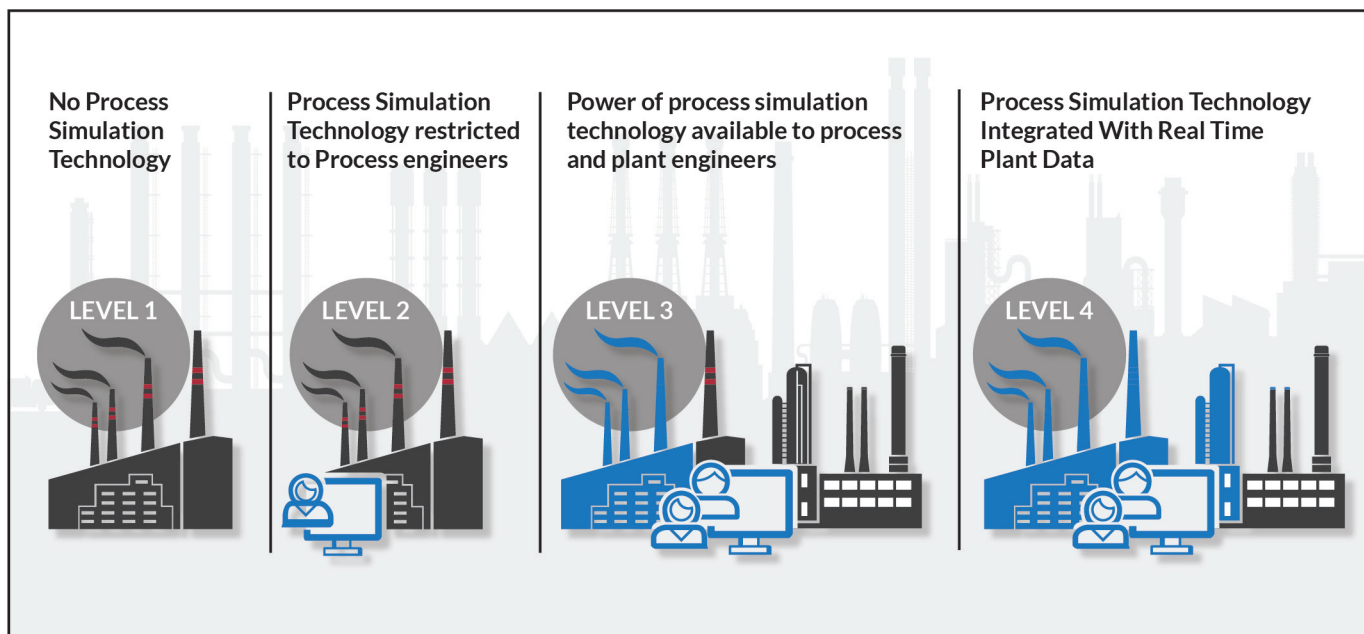


Figure: Refineries need to be mindful in considering the level of maturity at their companies

First clue: Heat Exchanger Maintenance and Monitoring

Heat exchangers are crucial to determining energy efficiency levels. Refiners need to know when is the best time to take them out for maintenance and minimize the impact on profitability. Separately, the rigorous simulation of the heat exchanger unit operations helps determine the level of fouling in each unit and its resulting economic impact.

This helps refineries set up prioritized maintenance schedule for their heat exchanger networks. To overcome the challenge of using disparate tools

Second clue: Column Operations Troubleshooting

With advanced process simulation software, users can accurately simulate the thermo-hydraulic functioning of columns based on their construction and operating conditions. This helps them better understand the behavior of columns and avoid operational mishaps. By simulating the operation of the column unit within the broader setting of the overall process, users can identify the root causes of their column problems and figure out the optimal point of operation for the overall process unit. In addition, visualization tools provide insight into the operating point of the column and highlight any impending breach of operational limits,

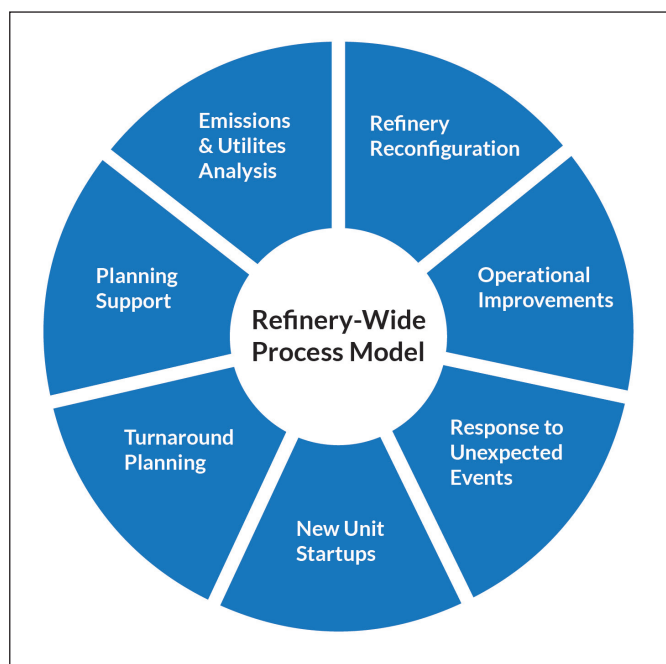


Figure: To embark on this journey to maximize profits, refineries need to unlock critical clues to profitability.

which causes issues – such as jet flooding, weeping, down-comer backup and others. This allows refineries to build a work culture of continual process optimization and preventive maintenance by taking advantage of advanced process simulation technology.

Third clue: Integrated Refining and Gas Plant Analysis

In using integrated solutions, engineers can create a rigorous simulation of refining and gas plant operations within a single simulation environment. This allows refinery operators to assess, if they can accommodate increased levels of sour crudes in their refineries.

It also allows them to preemptively adjust operations in the gas plants and suit new crude processing. By enabling feed flexibility, capacity creep and OPEX optimization via integrated refining and gas plant process simulation, refiners save millions of dollars each year in operating margins. They are also ensured of maximum reliability and plant on-stream time. The rigorous simulation of gas plant operations offers refineries the visibility and ability to better document their emission levels.

“By choosing a technology partner with the ability to present a comprehensive end-to-end solution platform, refineries can achieve world-class operational efficiency without depending on expensive consultants.”

Fourth clue: Planning Model Update

To manage their operations, refineries use planning tools to make better informed decisions. While traditional linear programming (LP) models are employed by these planning tools to find the most optimal plan, they are only accurate within a specific operating range of the refinery. Overtime, refineries move away from the operating range – for example, it can happen due to catalyst deactivation or other operational changes. This means that LP models become outdated, which reduces the effectiveness of the planning tools, which adds up to millions of dollars in lost profits. The solution is to maintain the planning models, with the help of advanced process simulation software. This enables updates when the models are out of sync with the operating range of the refinery. Process simulation software is key to this solution, providing the predictive capability that comes with rigorous process analysis based on reaction kinetics, heat and mass balance. Today, leading solution providers have built-in integration between process simulation and refinery planning to streamline the workflow of updating planning models. With these advanced tools, refiners can now follow the workflow without depending on external consultants. Taiyo Oil in Japan has reported a 12.7% increase in their refineries' profit from maintaining their refinery planning and scheduling tools using advanced process simulation solutions. This capability puts in place a culture of true partnership between planners and process engineers in maintaining planning and scheduling tools to maximize and sustain refinery profits.

Fifth clue: Refinery Wide Process Analysis – The Pinnacle of Technological Maturity

Refineries can develop a refinery-wide process model from their refinery-wide planning model relatively quickly with an advanced integrated solution for process simulation and refinery planning. The accuracy of the simulation model is enhanced by selectively incorporating rigorous models of reactor units to the refinery-wide flowsheet. With this methodology, users can have full control over the rigor and flexibility of the model. With this solution, refineries can use the model to accurately assess the economic impact of possible strategic reconfiguration projects. It also supports planners dealing with special cases that require a more accurate profit assessment versus what is projected by their LP tools. The model can



Figure: By systematically unlocking clues to increased profitability, Sherlock Holmes is literally left behind in this industrial game of Cluedo.

be used for rigorous profit-margin analysis when evaluating strategic reconfiguration options or operational improvements to the refinery. This becomes a handy tool in evaluating responses to unexpected operational events, as well as to determine turnaround and startup plans.

Beating Sherlock Holmes at his own game

Refineries need to be mindful in considering the level of maturity at their companies. Maturity levels range from zero to full maturity. At zero maturity, a refinery does not have the culture of using process simulation technology to support their operations. At full maturity, refineries employ refinery-wide process simulation models in a single flowsheet, which enables process engineers to support the refinery in strategic and operational decision making.

An inevitable element of this journey is for employees to be skilled in the latest technology and kept updated of industry best practices. By choosing a technology partner with the ability to present a comprehensive end-to-end solution platform, refineries can achieve world-class operational efficiency without depending on expensive

consultants. With these tools, refinery process engineers can develop their skill sets and process knowledge to become world-class engineers. Indeed, by systematically unlocking clues to increased profitability, Sherlock Holmes is literally left behind in this industrial game of Cluedo. ●



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