“About 56 percent of workers in the oil and gas industry are between 35 and 54 years old and the average industry retirement age is 55.”


“The results prove that the implementation of the ROMeo solution has reduced the energy consumption of our ethylene production unit and improved the effectiveness of the plant on the whole.”

—CNPC Jilin Petrochemical Co.
Enhance Performance and Profitability Refinery-wide

Every day the refinery industry is faced with new demands—demands for lower prices; for higher output; for enhanced worker productivity; for increased efficiencies of the conversion process, and so on. Unfortunately, the reality is that most plants have equipment that is 20 to 30 years old, processes that were not designed for today’s feedstock, and operators that are either ready to retire, or inexperienced and ill-equipped to run the refinery at peak performance.

Refiners require a set of tools that empower them to make decisions given a wide range of operating conditions. These changing operating conditions result from increasingly heavy crude feedstock, process disturbances that require immediate action, or changing product/utility prices that require operating changes for optimal profitability. Refiners need to be able to pick solutions for their most important projects or tasks and be able to build upon the foundation of individual solutions as their needs evolve.

So to meet the demands of improving performance and output in a changing environment, refiners need to do things differently — more effectively optimize the resources they do have, create a foundation for change, and establish good operating practices that will bring them into a state of higher performance.
Address the Basics

The fundamentals of operating a refinery start with a good plan (including selection of the crude feedstocks that will yield the highest profitability), and following it through with processes that can adapt to changing requirements. Refiners today need to:

- Plan and schedule crude receipt and processing
- Design new processes to deal with changing feedstock
- Debottleneck their process to increase throughput
- Train operators to run the plant and deal with disturbances more efficiently
- Train operators and plant personnel to work together
- Display key information to enable quick decisions
- Institute standard practices and workflow
- Enable personnel in the field to perform tasks efficiently and consistently
- Monitor the health and performance of equipment and other assets
- Optimize the refinery for profitability
- Manage off-site crude and product tank farms
- Account for all material entering and leaving the plant
- Control the process effectively
- Measure key performance variables
- Ensure safe operating conditions
- Minimize energy usage and cost

It would be easy to get overwhelmed handling just one of these tasks, but juggling them all requires expertise in many different areas across the spectrum of refining. Rudimentary tools and various informal spreadsheets are no longer enough. The demands on a refinery justify professional tools from a provider with experience to enhance performance and profitability.

SimSci Esscor Products Manage:

- 100% of the world’s 20 largest refineries
- 54% of the world’s daily refining capacity
- 51% of the world’s refineries
Break Down the Barriers and Enhance Performance and Profitability
Refinery Wide

The world’s leading refiners can enhance and drive sustainable performance by using real-time information and modeling solutions to obtain a deeper understanding of their refineries. Invensys Operations Management provides a unique and innovative set of software, services and solutions that specifically address emerging industry needs and operational issues, and are designed to drive optimal performance within a refinery. SimSci-Esscor provides modeling solutions that are the foundation of an optimized refinery which can be built upon with a variety of complimentary solutions from Invensys Operations Management.

Why SimSci-Esscor?

• De-facto standard in the industry and used by the top refiners in the world
• Provides unique and innovative refinery-wide modeling solutions
• Solutions complement other Invensys offerings in refining
• Identifies and addresses common refinery trends and problems

SimSci-Esscor and Spiral Software

A plant can only run as good as the feedstock allows, which is why SimSci-Esscor offers an enterprise crude oil knowledge management system. This is a crucial first step in enhancing the performance and profitability of a refinery as it brings together in-house and external information in any format, ranging from raw laboratory data through cargo tracking data and qualitative assessments of refinery compatibility. This integrated toolset allows consistent refinery data and model representation which enables collaboration across business users including laboratory, trading, engineering, planning and scheduling. This allows refiners to:

• Prevent margin loss due to poor information exchange
• Improve guidance from planning to operations
• Minimize plan versus actual variances
• Improve response to supply chain opportunities

Spiral Software (an Invensys company) technology enables SimSci-Esscor to deliver new refinery-wide optimization solutions that help clients to make better business decisions when trading and refining crude oils. Spiral Software offerings extend SimSci-Esscor software, which enable Invensys Operations Management to fully support the entire planning to operations value chain, helping our customers make better business decisions in real time, based on demand, market pricing and their own economic, capacity and supply chain constraints.
Heavy Oils

How are you operating your plant without accurately knowing the properties of your heavy oil feedstock?

SimSci-Esscor provides innovative and technologically superior Heavy Oils modeling methods that more accurately model heavier feedstock so that refiners can adapt their processes accordingly – whether by designing new equipment or processes, or altering current operating conditions. Ranging from liquid viscosity prediction and liquid thermal conductivity to contaminant solubility prediction, these proprietary methods exceed the accuracy of any other methods currently on the market. This proprietary heavy oils technology is built into SIM4ME Thermo which allows the heavy oils methods to be used in all of our products – making it easy to use the technology in various parts of the plant lifecycle.

Invensys Offerings for Heavy Oils Processing

- Flow Assurance
- Network Optimization
- Process Design
- Operation Training Simulations
- Optimization
- Workforce Enablement
- Tank Farm
- Terminals
- Heavy Oil Modeling
- Crude Assay Management
- Utility Optimization
- Upstream Design
- Crude Sourcing and Planning
Workforce Enablement

Dealing with Inexperienced Operators

Whether the refinery is dealing with an aging workforce or already has a workforce of inexperienced operators, it is becoming increasingly important to enable the workforce to run the plant safely and profitably. Unfortunately, refineries are ill-prepared to deal with this problem as there is a growing lack of experienced operators to run the plant safely and profitably. As refineries increasingly rely on inexperienced operators their safety risk increases.

Invensys provides a comprehensive set of solutions to enable operators to run the plant safely and profitably. The solutions vary from training operators to perform their job effectively and appropriately, to providing the necessary information to make decisions and automating the decision process.

Under SimSci-Esscor, Operator Training Simulators (OTS) allow operators to train on a computer in an identical environment to the control room. The DYNSIM model that controls the plant response behaves in the same manner as the actual plant, which provides trainees with an accurate means to train and develop experience so that when they do work with the real plant they can perform appropriately.

A complementary training solution, EYESIM, takes OTS to the next level, by providing a virtual three-dimensional (3D) environment based on the actual plant that allows the field operators and maintenance personnel to train in a realistically simulated environment to further gain valuable experience in a safe, true-to-life environment.

“The average cost per major incident related to operator error exceeds $80 million.”

—J & H Marsh & McLennan
Optimization

Global Pressures Necessitate Optimization
Today’s refiners are being placed under greater economic pressures both by the declining global economy and regional regulations. Increased pricing pressure affects profitability and requires enhanced performance to allow the plant to remain profitable. Additionally, regulatory compliance and adherence to increasing stringent safety standards can adversely affect a refinery’s bottom line. Decreased margin from increased competition is forcing refiners to evaluate means to run more profitably or else face possible closure of their unprofitable facilities. Refineries have been implementing profit generating activities for years, but the key is implementation and sustainability of a full-scale optimization program.

Invensys has extended its best-in-class solutions under SimSci-Esscor for refinery optimization through integration of various individual products and applications designed to capture all areas of profit opportunity by providing the best optimization and regulatory compliance solutions for a refinery.

Process Optimization
SimSci-Esscor ROMeo is the standard for process optimization in refining and can be used for both online performance monitoring and process optimization. During performance monitoring, ROMeo trends the performance of equipment to identify problems and pinpoint equipment operational issues. During process optimization, ROMeo automatically imports process data, reconciles that data, and based on current economic conditions and constraints optimizes the process within a set of operational bounds.

Off-sites
Tank farms make up a large portion of a refining complex. Increased automation and operational performance reduces the cost of terminal operations, while at the same time minimizing operator errors, improving safety compliance and business performance. Invensys Off-sites solutions have been in use in terminal and refinery sites globally for over 25 years, serving all of the major oil companies.

Planning and Off-sites
Tank farms make up a large portion of a refining complex. Increased automation and operational performance reduces the cost of terminal operations, while at the same time minimizing operator errors, improving safety compliance and business performance. Invensys Off-sites solutions have been in use in terminal and refinery sites globally for over 25 years, serving all of the major oil companies.

Refiners can now leverage blend operations and optimization practices to improve efficiency and profitability across the entire refinery. Crude blend data available from off-sites blending operations can be used as input to process optimization software. Product properties that are calculated by process optimization software can then be used in off-sites product blending operations.

Such integration offers many benefits, among them:

• Improved ROMeo results with actual blended crude assay data
• Optimized off-sites product blending with ROMeo-supplied product data to reduce product giveaway and/or the need for costly reblands
• Automated LP model updates from ROMeo
• Spiral Planning & Scheduling enables strategic and tactical planning, scheduling, and analysis to maximize refinery profitability
**Invensys Yield Accounting Solution**

Operating companies require reconciled material balance information to make operating decisions and to measure performance and profitability. This is problematic because a material balance on a refinery requires numerous measurements along with the reconciliation of those plant measurements since small inaccuracies propagated throughout a data reporting system can lead to large year-end reportable monetary losses for the company.

The Invensys integrated and bundled Yield Accounting System is unique in the market, providing:

- Increased accuracy and reliability of plant data, correcting inaccuracies and reducing or eliminating losses
- Consistent, reliable data for performance measures
- Improved instrument maintenance efficiency
- Better feedstock data for process yield simulators and tracking

**Advanced Process Control**

While ROMeo is able to optimize operations once they have achieved steady-state, the Connoisseur Advanced Process Control (APC) solution from SimSci-Esscor offers optimization within a smaller time-frame. APC can help control a process to desired set-points to minimize fluctuation in the controllers and optimize output.

**ACA.HF**

The ACA.HF is the new standard in safety, simplicity, reliability, and accuracy for analysis of HF alkylation process performance. ACA.HF is a way to safely and simply obtain online measurement of %HF, %Water and %ASO in HF alkylation. This solution is an affordable alternative to FTNIR with highly reliable and repeatable accuracy. In fact, ACA.HF exceeds the precision of HF analysis with FTNIR. ACA.HF is a multi-variable analyzer based on the application of proven Foxboro® measurement technologies that are long-established in online analysis of process streams. The fact that measurements can be made in real-time with no safety risk allows refineries to obtain the necessary results without the risk of an accident or plant downtime.
Wonderware® Intelligence provides the visualization technology that allows operators to access key performance indicator (KPI) visibility and monitoring through interactive dashboards in near real time. This provides key information in desired context across Invensys and non-Invensys sources of operations data to achieve on-the-spot and accurate operational decision making.

Mobile Solutions from Wonderware IntelaTrac enable workflow, data collection and general task management throughout the plant.

Avantis® Condition Manager is tied to asset health, reliability and/or availability. Predicting asset failures before they occur on critical refinery equipment can result in significant costs savings. Condition Manager collects data from any plant floor system which is OPC-compliant, analyzes that data, then acts upon it — letting operators know of any problematic conditions early enough to enable maintenance personnel to take corrective action before they escalate into serious upsets or, worse yet, unplanned shutdowns.

ArchestrA® Workflow is powerful business process management software that: a) helps capture and enforce consistent policy and procedural execution from plant automation to Enterprise Resource Planning (ERP), b) enables a reduction in process and response latency, and c) provides the open framework to support the necessary governance, including notifications, escalations and approvals of all stakeholders in the collaboration environment.

Invensys Operations Management offers several complementary solutions that build upon the products and solutions of SimSci-Esscor.
Partner for Profitability

Invensys Operations Management provides a unique and innovative set of refinery-wide software, services and solutions aimed at addressing emerging industry needs, operational issues, and driving optimal performance. These solutions provide refiners with real-time information and process models that enhance and drive sustainable performance.

- SimSci-Esscor provides unique and innovative refinery-wide modeling solutions
- The solutions for refinery-wide modeling are comprehensive and complete, backed by an expert global delivery services organization
- Our experience and global reach makes us the partner of choice
- SimSci-Esscor is the de-facto standard in the industry and is being used by the top refiners in the world