ADVANCED OPTIMIZATION SOLUTION IMPROVES OIL PIPELINE CAPACITY UTILIZATION

PIPELINE SOLUTION TRANSFORMS ASSET UTILIZATION AND BUSINESS PERFORMANCE

An oil and gas company operating one of the world's longest crude oil pipeline systems faced business challenges due to legacy processes and systems. The company transports crude oil and refined petroleum products equivalent to 13% of US crude oil consumption and 65% of Canadian production. However, sub-optimal allocations caused high apportionment and diversion of nominated volumes to pipelines of competitors, leading to revenue loss. The company faced a business imperative: manage the complexity of operations while enhancing business performance.

The company sought to optimize operational costs, improve capacity utilization and mitigate business risks by undertaking a transformation program. It partnered with Infosys to retire legacy processes and systems and transform the technology landscape.

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The scope of our engagement spanned business requirement gathering, analysis, design, development, implementation, and support. The objectives included –

- Allocate approximately 2.2 million barrels of 80 unique crude oil commodities across a 25,420 km pipeline network, every day

- Address more than 500 operational constraints to manage assets and comply with interstate pipeline regulations of the National Energy Board (NEB) and Federal Energy Regulatory Commission (FERC) in North America

- Maintain pipeline integrity while maximizing operating margins

- Ensure equitable distribution, predictable delivery, and consistent quality of products to customers

- Capture experiential knowledge of the workforce in a knowledge ecosystem

Infosys developed a customized solution using Java, the Oracle 11g Fusion Middleware technology stack and Service-Oriented Architecture (SOA).

SOA-based transformation program

Volumetric Allocation (VA) solution	Equipment configuration solution	Training and knowledge transfer	Maintenance impact on pipeline capacity solution	Business and operational rules engine	Knowledge management system

Versatile system

Infosys designed a first-of-its-kind crude oil transmission solution by defining future state processes and data models. We addressed the complexity of business operations with a portfolio of interlinked solutions, a combination of Waterfall and Agile approaches, and proprietary tools to define requirements:

Volumetric Allocation (VA) solution

Our core solution combines mathematical modeling and constraint propagation-based optimization algorithms for crude allocation in batches across pipelines. It optimizes pipeline capacity and asset utilization by simultaneously evaluating more than 1,000 notices of shipment scenarios and the impact of parameters such as capacity options, heater and Drag Reducing Agent (DRA) on-off options, and maintenance activities. Our solution facilitates informed decision making by providing optimal allocation options after taking into account over 500 operational constraints as well as critical metrics to manage costs such as power consumption, quality, DRA, capacity utilization, and

transit time. It maximizes capacity utilization through intelligent scheduling of maintenance activities, evaluation of line disposition and shut down, and better routing of crude volume in the pipeline network.

Maintenance impact on pipeline capacity solution

The ancillary solution captures the impact of scheduled and unscheduled maintenance activities on capacity in the pipeline network and routes the information to the VA solution for prioritizing activities to be scheduled or deferred in a month.

Equipment configuration solution

The independent solution, which feeds into the core system, facilitates equipment management by storing data on diverse equipment, including pipelines, storage tanks and pumps, in a central repository.

Business and operational rules engine

Our flexible rules framework solution hosts and manages business and operational rules to provide a 'single source of the truth' for enterprise applications. Rules

can be easily reconfigured for specific business requirements. Our business rules governance strategy defines maintenance of current, accurate, and unambiguous rules, and tracks violations.
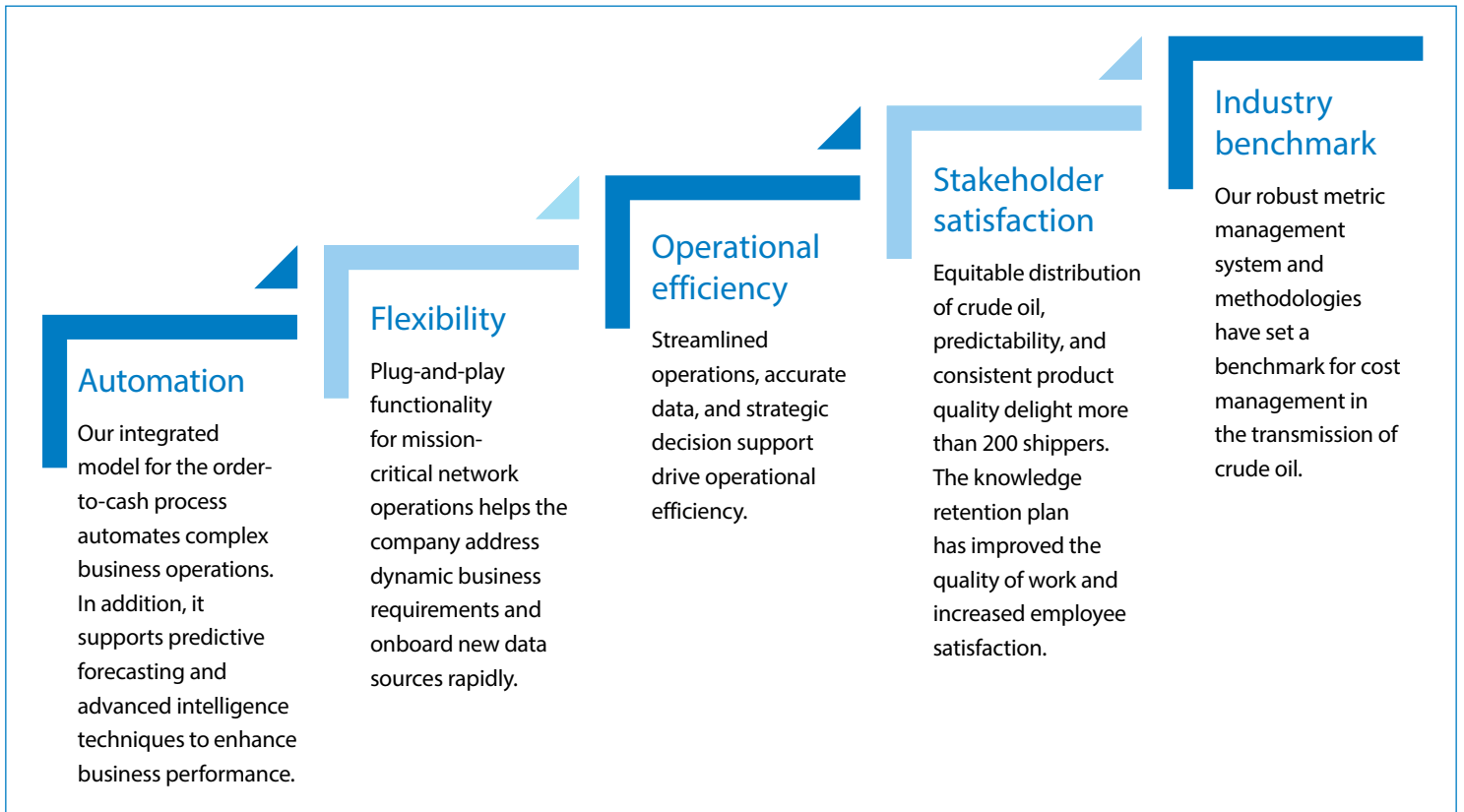
Training and knowledge transfer

We developed a standalone solution to validate the business logic. It demonstrated automation of real-life scenarios. We involved end users in the development phase to accelerate learning and familiarize business users with the future state system before testing. It ensured faster User Acceptance Testing (UAT) and accelerated user adoption.

Knowledge management system

Our system derisks operational decisions by replacing human intervention with algorithms. The Infosys team distilled experiential knowledge of engineers and schedulers into more than 30 types of business rules and mathematical models. Our data models optimize crude flow across the pipeline infrastructure, while the knowledge repository preserves enterprise knowledge accumulated over the years.

Future-proof operations

Our modular, flexible, and scalable solution is equipped with state-of-the-art components to drive operational excellence at the oil and gas company.

Automation

Our integrated model for the order-to-cash process automates complex business operations. In addition, it supports predictive forecasting and advanced intelligence techniques to enhance business performance.

Flexibility

Plug-and-play functionality for mission-critical network operations helps the company address dynamic business requirements and onboard new data sources rapidly.

Operational efficiency

Streamlined operations, accurate data, and strategic decision support drive operational efficiency.

Stakeholder satisfaction

Equitable distribution of crude oil, predictability, and consistent product quality delight more than 200 shippers. The knowledge retention plan has improved the quality of work and increased employee satisfaction.

Industry benchmark

Our robust metric management system and methodologies have set a benchmark for cost management in the transmission of crude oil.

Benefits of the Infosys solution

- Improved capacity utilization of the pipeline network, and increased recurring incremental revenue

- Reduced power cost per barrel of oil transported significantly

- Minimized product degradation costs

- Improved operations through processes, business intelligence, and alerts

- Ensured scalability to effect changes to the network such as addition of pipelines and commodities, and changes to shippers, routes, and network configuration

- Ability to measure capacity accurately based on the supply profile as well as disposition on the lines

- Facilitated better decision-making through reporting and graphical representation of volume allocations

- Enabled 'What-if' analysis using a parallel verification tool developed by Infosys

The Infosys solution improved capacity utilization of the pipeline network and generates year-on-year multi-million dollar incremental revenue for the oil and gas company.

For more information, contact askus@infosys.com

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