SAUDER School of Business
UNIVERSITY OF BRITISH COLUMBIA

COE CENTRE FOR OPERATIONS EXCELLENCE

Centre for Operations Excellence

Equipment Lifecycle Strategy Analysis for an International Shipping Corporation

Client Profile

The client is a world-leading provider of international crude oil and petroleum product transportation services, transporting more than 10 percent of the world's sea-borne oil. With offices in 12 countries, the client employs more than 4,200 seagoing and shore-based staff around the world. The company has earned a reputation for safety and excellence in providing transportation services to major oil companies, oil traders and government agencies worldwide.

Business Challenge

Equipment maintenance and replacement is a complex decision-making process for the client. Choosing an effective strategy for each piece of equipment involves a trade-off between reliability and cost. The client has been faced with a challenge of managing equipment lifecycles in a cost-effective manner without jeopardizing the safety of its operations. This COE project aimed to provide the client with a decision support tool to evaluate equipment lifecycle strategies to effectively manage total ownership costs and risks for a vessel's operating equipment.

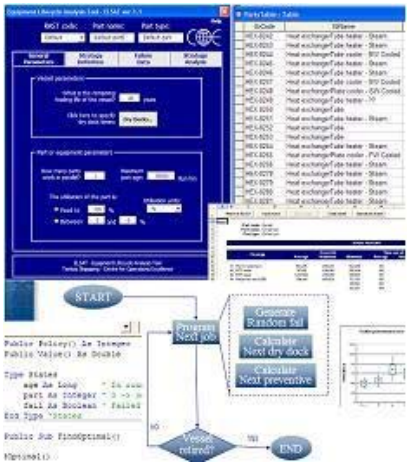
Value Delivered

The COE team developed an Equipment Lifecycle Strategy Analysis Tool (ELSAT), a support decision tool with the following functionalities:

1. Evaluation of different maintenance strategies on the basis of costs and reliability.
2. Selection of a recommended strategy by assessing both operational and risk associated costs.
3. Survival analysis of historical data to find associated failure rates.

Along with the development of the tool, the COE also provided the client with recommendations on future data collection methods that would help obtain useful information for making the decision support process more reliable over time.

The COE Approach



Step 1: *Process Mapping*
Through meetings with management and operations employees, a framework for managing equipment life cycle was established.
Step 2: *Survival Analysis*
An analysis of existing data to find survival probability estimates for relevant parts was performed.
Step 3: *Simulation*
Monte Carlo simulation models were developed to evaluate different user-defined or ELSAT-recommended maintenance strategies.
Step 4: *Optimization*
A Markov Decision Process model embedded in ELSAT identified and recommended an optimal strategy based on the assessment of operational and risk costs and the part's failure rate.

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Analytics and Operations Research