

CORPORATE INFORMATION

Performance Asset Management - Modeling and Simulation Solutions

Introduction

Clockwork Solutions has the expertise, experience, technology, and methodology to solve challenging problems in asset management. Clockwork's SPAR™ simulation and modeling technology is unique in being able to accurately predict asset performance and life cycle costs. Examples of capital assets that Clockwork can help manage include: power plants and their distribution systems, fleets of vehicles with logistical support structures, and petrochemical factories.

Managing Risk

Accurate prediction of performance and life cycle costs entails predicting possible outcomes within a range of possibilities:

- What is the likelihood that the asset will perform as intended?
- What is the impact of that risk?
- What are the costs associated with the asset not meeting its performance goals?

Typically, Clockwork's asset management technology helps make decisions about issues such as:

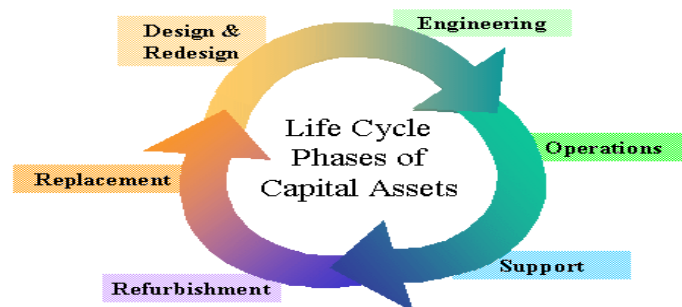
- Can targeted performance be reached with the current design?
- Are the right number of spare parts on hand at the right time and at the right place?
- Can life cycle costs be reduced without adversely affecting the performance?
- What are the trade-offs between improved performance and cost?

Clockwork's expertise is its unique ability to integrate all contributing characteristics of the asset and its environment including the reliability of its constituent components, its expected usage, the capacity and responsiveness of its support system, and the costs attributed to all of these characteristics.

Throughout the Life Cycle

SPAR™ is applicable across all phases of the asset life cycle including:

- Design
- Engineering
- Operations
- Support
- Refurbishment
- Replacement
- Redesign



Asset Management Creates Value

Clockwork customers have realized a net value of over \$2 billion by determining the minimal capital investment required to achieve performance objectives, assessing and optimizing the operability of their equipment, identifying performance and cost drivers, sources of risk, customizing support practices and resources to fit operating profiles and age, and quantifying the benefits of proposed improvements.

A typical Clockwork customer is a large industrial, government, or military organization that has significant long-term investments in capital assets, has a low tolerance for failure or malfunction, and is continually looking for ways to maximize asset productivity, prolong asset life, decrease downtime, and reduce ownership cost.

Asset Performance Metrics

Asset performance is typically measured in terms meaningful to the customer/owner such as:

- Availability
- Production
- Downtime
- Spare parts cost (both used and unused)
- Operations and maintenance cost
- Costs associated with lost customer goodwill caused by unexpected failures

Asset performance is affected by the characteristics of the asset itself such as its design (e.g., redundancy) and the inherent reliability associated with its failures (which again depends upon the reliability of its components and subcomponents). In addition, performance is affected by the environment and is dependent on factors such as support policies and processes that control the asset's use, maintenance processes (and consequently, effectiveness of repair), and lead times for awaiting maintenance, spare parts, and transportation. All of these factors are themselves further dependent upon the characteristics of other assets and environments. The number and inter-relationships between all of these factors makes forecasting performance and cost inherently difficult.

The Solution - SPAR™

Clockwork reduces asset ownership costs by forecasting the performance and life cycle costs of an asset through its proprietary SPAR™ modeling technology and its extensive, multi-industry experience. SPAR™ can be used to construct reliability-based models that can quantify risks, identify their sources, predict and optimize the future performance of an asset and its associated life cycle costs. SPAR™ utilizes a Monte Carlo approach because these techniques are the only known mathematical techniques powerful enough to account for the real-world complexity of an asset's behavior and environment.

Clients can license Clockwork's SPAR™ technology in the form of Windows-based software, or they may choose to engage Clockwork or its strategic partners to undertake SPAR-based projects. Several SPAR-based software packages are available for a number of industrial, commercial, and defense-related applications.

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