

Implementing Operational Readiness

Flawless Startup & Steady State Availability for First Operating Cycle

Operational Readiness Benefits

- ✓ Increase Production Availability by 2–6%
- ✓ Reduce CapEx by 2–5%
- ✓ Reduce TCO by 5–25%
- ✓ Reduce Inventory Cost by 5–10%
- ✓ Reduce Reactive Maintenance by 10–40%

Resulting in:

- ✓ Business Case Achieved
- ✓ High Client/Owner Satisfaction
- ✓ Competitive \$ Per Unit Production
- ✓ Resiliency During Business Downturns



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What is Operational Readiness?

An Operational Readiness Program is executed from the project's inception and throughout the commissioning and startup phases. This program has four primary objectives:

1. Ensure that projects meet first cycle of operations at the required production availability with minimal disruptions impacting health, safety, reputation, and product quality.
2. Ensure assets are developed in accordance with the Capital Expenditure (CapEx), Operating and Maintenance Expenditure (OpEx) and Total Cost of Ownership (TCO) priorities and production performance requirements as directed by the business case.
3. Successfully set up the Asset Management Program for execution during the Operations and Maintenance (O&M) phase.
4. Train, organize and ready the reliability and maintenance workforce for the execution of the Asset Management Program, beginning day one.

Why an Operational Readiness Program?

The Operational Readiness Program provides benefits for commissioning and startup, production availability and the reduction of Capital Expenditure (CapEx), Total Cost of Ownership (TCO) and Operational Expenditure (OpEx).

Opportunities	Operational Readiness Program Benefits
Commissioning & Startup	<ul style="list-style-type: none"> • Mitigates and eliminates design and construction defects, which impact commissioning and startup. • Flawless startup on first operating cycle, meeting production targets.
Production Availability	<ul style="list-style-type: none"> • Ensures that the design meets the contractual production availability/capacity target. • Identify the design options to increase production availability by 2–6%.



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TCO Reduction Opportunity Over Project Lifecycle

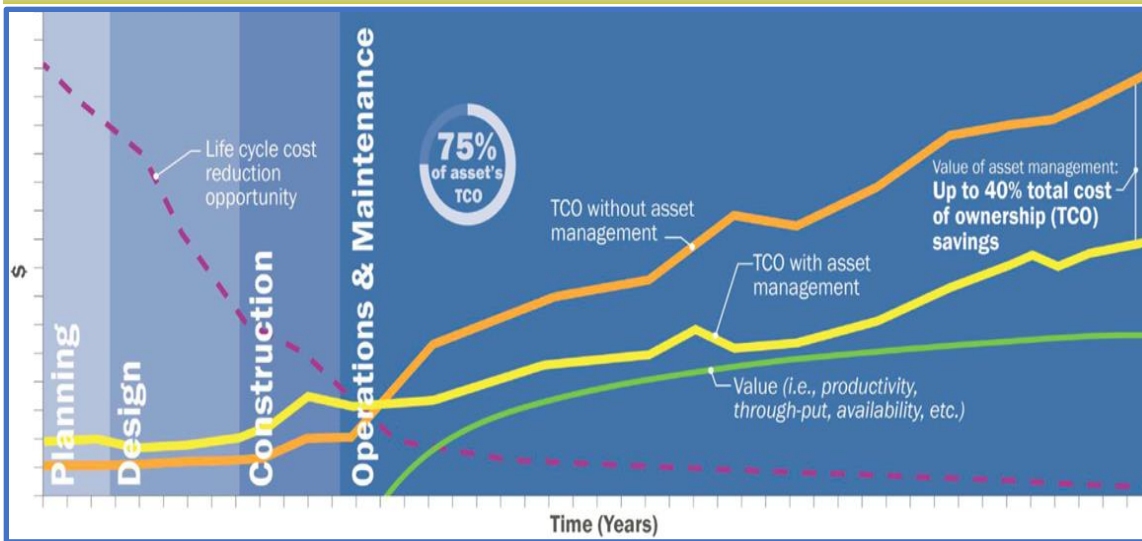
75% of the TCO is expended during the O&M phase. This 75% is all but fixed by the activities within the design, construction and commissioning phases. In other words, the majority of TCO is fixed before the plant even starts the O&M phase. Without Operational Readiness, the plant severely limits its ability to optimize TCO, or worse, the plant pays a premium for startup issues and higher than necessary equipment failures and OpEX.



Operational Readiness Program Opportunities

- ✓ Flawless Commissioning & Startup
- ✓ Production Availability Assurance
- ✓ CapEx Reduction
- ✓ TCO Reduction
- ✓ OpEx Reduction
- ✓ Digitalization Preparedness

Opportunities	Operational Readiness Program Benefits
CapEx Reduction	<ul style="list-style-type: none"> • Ensures that the new assets/system meets availability and capacity requirements with minimal capital investment; potentially resulting in 2–5% CapEx reductions. • Implements cost-effective design options: Storage tank buffering, bypass and valve arrangements and operation contingency plans to reduce asset installed redundancy whilst meeting the production availability target. • Implement offline sparing options and capital spares procurement and storage to improve asset maintainability to ensure that unplanned corrective maintenance durations of un-spared assets have minimal impact on production availability. • Apply electronic health monitoring on un-spared assets to increase reliability and reduce maintainability times.
TCO Reduction	<ul style="list-style-type: none"> • Enables design options which minimize the TCO of the new assets/system, potentially resulting in 5–25% TCO reduction.
OpEx Reductions	<ul style="list-style-type: none"> • Develops asset strategies and inspection plans based on the criticality of assets and their failure modes and consequences, yielding 10–40% reduction in reactive maintenance. • Develop asset strategies and inspection plans to align with reliability and maintenance cost targets. • Design decisions are implemented for improvements to maintainability, operability and reliability such as access, equipment selection/modifications, spares management and equipment health monitoring. • Develop plans, procedures and workforce development programs to execute asset strategies in a manner that is “sustainable” and cost-effective, improves maintainability and reduces infant mortality failure rates. • Optimization of spares reorder points and min/max inventory levels, resulting in 5–10% inventory cost reductions and improved maintainability.
Digitalization Preparedness	<ul style="list-style-type: none"> • Establishes digital thread for assets and builds upon this thread in each successive phase. • Incrementally develops the asset digitalization platform for execution during the O&M phase.



An Effective Operational Readiness Program

Systematically aligns:

- ✓ People/Organization
- ✓ Process
- ✓ Tools/Technology

Elements of an Effective Operational Readiness Program

An effective Operational Readiness Program aligns people/organization, process and tools/technology in a coordinated and systematic manner and at the right time to achieve the targeted benefits indicated above. The table below indicates the key objectives that must be accomplished in each of these areas.

Impact Areas	Key Activities
People/Organization	<ul style="list-style-type: none"> • Ensure clear organization alignment with business drivers for the Operational Readiness Program. These drivers include: value to customer; competitiveness; reduced TCO, CapEx, OpEx and HSE incidents; production availability increase/target compliance; and engaged and developed workforce. • Ensure organization commitment to Operational Readiness Program deliverables at each stage gate, locking in the benefits.
Process	<ul style="list-style-type: none"> • Ensure integration between operational readiness modules and associated process activities, indicating inputs/outputs of work products and information/data flow between modules. • Ensure there are work instructions and SMEs trained on each operational readiness module. • Ensure that the operational readiness activities are appropriate based on the informational details available during each phase: Inception → FEED → Detail Design → Construction → Commissioning/Startup. • Ensure that the work products from the operational readiness activities are timely, such that design changes and operational decisions can be conveniently executed. • Ensure that the level of effort (for strategies, job plans, work instructions, spares management, etc.) allocated to assets are in sync with the assets' criticality rating.
Tools/Technology	<ul style="list-style-type: none"> • Align tools/technologies to support the business processes of the integrated operational readiness program, and not the other way around. • Ensure that the CMMS/EAM is properly set up and populated, and capabilities fully exploited. • Ensure that tools/technologies (such as an Asset Performance Management (APM) platform) can support an integrated Operational Readiness Program. • Ensure availability of good-quality and consistent asset data to support an APM platform. • Ensure the digital maturity of the organization is at a level capable of supporting an APM platform.



About Phoenix Engineered Solutions Inc.

Phoenix Engineered Solutions Inc. is a consultancy and engineering firm based out of Edmonton, Alberta, Canada. Our firm provides engineered solutions and services to ensure operational readiness of projects and to improve asset reliability, integrity and sustaining costs within operating plants.

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Integrated Operational Readiness

Accessing the benefits of Operational Readiness requires a holistic end-to-end process across the entire life cycle of the project. Additionally, the Operational Readiness activities are "right" sized for each project based on the project's scope and complexity. The Operational Readiness Program comprises the following integrated modules, which encompass the processes and activities that are applicable to the project phases based on the level of details/information available and the operational readiness deliverables required prior to the stage gate review:

Operational Readiness Modules	Applicable Project Phase
Business Case for CapEx, OpEx, TCO	Initiation
Operational Expenditure Estimate	Initiation → Feasibility → Front End Engineering Design (FEED) → Detailed Engineering (increasing accuracy based on progressive project details)
Operational Readiness Planning & Budgeting	Feasibility → FEED → Detailed Engineering → Construction
Production Availability Assurance (Reliability Availability Maintainability (RAM) Analysis)	Feasibility → FEED → Detailed Engineering → Construction
Total Cost of Ownership (TCO) Analysis	Feasibility → FEED → Detailed Engineering
Asset Reliability & Maintenance Work Management System	Feasibility → FEED → Detailed Engineering
Operational Risk Register & Mitigation Action	FEED → Detailed Engineering (risks identified; based on the phase, the risk mitigation action can be executed)
Maintenance Workshops & Associated Facilities	FEED → Detailed Engineering (based on progressive project details)
Mechanical Completions	FEED → Detailed Engineering (based on progressive project details)
Design for Reliability, Maintainability and Operability	FEED → Detailed Engineering → Construction (based on progressive project details)
Equipment Criticality Assessment	FEED → Detailed Engineering
Risk-Based/Conventional Mechanical Integrity	FEED → Detailed Engineering
Equipment Strategies for Rotating, Electrical and Instrumentation Asset Class	FEED → Detailed Engineering
Asset Register Development	FEED → Detailed Engineering
Materials & Inventory Management	FEED → Detailed Engineering
Maintenance & Inspection Planning	Detailed Engineering
Condition-Based Monitoring System Development	Detailed Engineering → Construction → Commissioning
Advanced & Predictive Analytics Program Development	Detailed Engineering → Construction
Asset Information Lifecycle Management	Detailed Engineering → Construction
Maintenance & Inspection Workforce Development	Detailed Engineering → Construction → Commissioning
Asset Performance Management Platform Planning & Implementation	Detailed Engineering → Construction → Commissioning
CMMS/EAM Implementation	Construction → Commissioning