### Maintenance System Effectiveness Audit

This audit will determine the level of maintenance management system prevailing in the organization, and benchmark it against world-class maintenance practices.

**Methodology**

* Trained and experienced consultants of Hofincons will inspect the facility and conduct a series of interviews with all levels of management. The effectiveness of the audit will be supported by the quality and granularity of information gathered in interviews with customers’ operation, maintenance and support services teams.
* Hofincons utilizes its very own in-house software, which is designed to bring out the strengths and weaknesses in the maintenance management system and point out areas for improvement.
* The present status of maintenance will be objectively analyzed.
* Hofincons will perform a gap analysis to highlight the way things are and the way things should be.

**Benefits**

* Performance of a detailed study of existing maintenance system and maintenance philosophy.
* Analysis of the strength and weakness.
* Comparison with world-class maintenance practices.
* Identification of remedial measures to overcome weaknesses and move towards world-class maintenance.

###

### Functional & Equipment Criticality Analysis (FCA & ECA)

Criticality assessment helps in ranking plant equipment according to the order of their importance and risk position. This ranking process helps in optimizing maintenance activities and prioritizing maintenance needs on the basis of their criticality to business and HSE interests of the company.

**Methodology**

* Asset break down structure is developed, and the function and equipment relationship is established.
* A cross-functional team analyzes all failure consequences, considering their effect on production, safety and environment.
* Functions and plant equipment will be ranked as Extreme, High, Medium and Low.

**Benefits**

* Fixing of maintenance requirement of each asset in the plant based on the criticality rating.
* Facilitates in assigning work order priority in the CMMS/EPR environment.

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### Reliability Centred Maintenance (RCM)

RCM is considered as a proven methodology to develop world-class asset management strategies. We have the expertise in implementing RCM for oil & gas, petrochemical and fertilizer industries.

The objectives of RCM are to:

* + Improve reliability without compromising technical integrity
	+ Enhance availability
	+ Optimize maintenance cost
	+ Provide monitoring plan to sustain benefit

**Methodology**

* Critical equipment is identified during the course of criticality analysis.
* A cross-functional team comprising of operational and maintenance personnel will analyze each equipment type by utilizing the FMEA technique.
* Appropriate maintenance strategy, task, resource requirement is determined based on the RCM process.

**Benefits**

* Meeting the required safety and environmental protection levels.
* Maximization of equipment availability.
* Minimized cost (including the cost of maintenance /repair, and the cost of lost operations due to scheduled and unscheduled downtime).
* Increased asset life.

RCM creates a documentation trail of decisions made in the development of a maintenance program. This documentation is useful for updating maintenance requirements as additional operating experience is gained.

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### Risk Based Inspection (RBI)

In an operating plant or installation, a relatively large percentage of risk is associated with a small number of the equipment items. Structured analysis helps in identifying high risk assets and focusing on appropriate effort to lower risk assets. Although RBI does not aim at extending inspection intervals, its focus is on prioritizing and managing the effort of an inspection program to rationally allocate inspection resources.

**Methodology**

* The RBI method defines the risk of operating equipment as the combination of two separate terms:
	+ Consequence of failure
	+ Likelihood of an undetected failure
* The **consequence of failure assessment** takes into consideration defined scenarios in which leaks lead to undesirable events and estimates the physical effect of each scenario, including the adverse effect on people, equipment, environment and productivity as a result of the outcome.
* The **likelihood of failure assessment** takes into consideration such criteria as damage mechanisms applicable to the item analyzed, the inspection history of the item, and the effectiveness of the previous inspection.
* Hofincons is conversant with all three levels of risk analysis as per API 581 such as Qualitative, Quantitative and Semi Quantitative.

**Benefits**

* Optimization of inspection plans and periods for equipment based on level of risk.
* Marking of operational boundaries, which prevent unexpected equipment damage mechanisms/rates.
* Identification of risk mitigation measures and other actions to safeguard integrity.
* Shifting of inspection and maintenance resources to provide a higher level of coverage to the high-risk items and an appropriate effort on lower risk equipment.

### Reliability, Availability and Maintainability Studies (RAM)

RAM analysis can be performed during FEED and detailed design phases of engineering projects. It helps in analyzing system performance with different scenarios validated against targeted availability.

**Methodology**

RAM analysis is performed by utilizing commercially available software such as Reliasoft Blocksim 7 on basic data pertaining to reliability, availability and maintainability. The reliability block diagram used to define the system/sub-system and its configuration effect is analyzed with different scenarios. The system/subsystem, which is most influential to the overall availability, will be analyzed in great detail to optimize the performance of the overall system. Modification recommendations for achieving availability performance are made based on the results achieved.

**Benefits**

* Systematic analysis to evaluate capabilities of the systems to perform intended functions.
* Identification of bottle-necks during green field stage helps in re-design and cost benefits.
* Identification of critical subsystem and understanding their interdependencies.
* Greater visibility on equipment need for improvement.
* Estimation of failure-free operating periods.

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### Root Cause Failure Analysis (RCFA)

RCFA is a process of identifying the source or origin of a particular failure so that it does not recur. It is a structured methodology for investigating, categorizing and eliminating the true root cause of a failure and determining the course of corrective or preventive action.

**Benefits**

* Avoidance of repeated failures.
* Enhanced maintenance and operation procedures to improve asset life.
* Improved operating efficiency and better plant availability.
* Identification of training need.
* Reduced maintenance cost.

###

### Operability & Maintainability Review (O&MR)

It is the systematic review process of 3D plant models to verify the plant’s operability and maintainability. It ensures that each item of the equipment/piping installed within the facility can be adequately operated and maintained.

**Methodology**

* Dedicated equipment type checklist and procedures will be developed to verify that the plant is designed to maintain and operate adequately.
* The review process covers following areas:
	+ Dismantling, removing and reassembling of any equipment without affecting adjacent facility
	+ Sufficient accessibility for Inspection and routine operator checks
	+ Depressurisation, purging, drain, flushing, blowdown, isolation and ventilation performed without affecting adjacent facility
	+ Suitability of electrical equipment used in hazardous locations
	+ Review of adequate ventilation for electrical items
	+ Verification of emergency escape routes, emergency showers and eyewash stations
	+ Provision of adequate process sampling and gas testing points
	+ Provision for bulk supplies loading and unloading

**Benefits**

* Review and redesign during engineering stage of the project.
* Avoidance of costly redesign and production loss on the operational stage by identifying shortfalls at the early stage of the project.

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### Bill of Material Development (BOM)

Bill of Material is a logical drilldown of equipment to its components and quantities needed for its asset lifecycle. Levels are defined based on maintenance, purchasing and planning perspectives.

**Benefits**

* Facilitates spare parts allocation during maintenance planning and scheduling
* Optimization of inventory