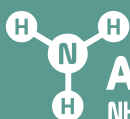


MAINTENANCE OPTIMIZATION PLAN FOR FERTILIZER PLANTS



AmmoniaKnowHow.com

NH₃ HNO₃ CH₃OH NPK (NH₄)(NO₃)

owned by **Fertilizer Industrial Services Ltd**

www.fertilizer.services

Fertilizer Industry Demands

The effective Maintenance Optimization Plan deployed at the right time with the right resources and industry knowhow is key to meeting performance objectives and business model.

- The ability to adjust to varying operating and environmental contexts is a high advantage capability in the current market.
- Aim of the maximum performance from your assets.
- Adopting a culture of "Reliability over Repair" through Asset Performance Management (APM).
- The most time and resource efficient Turnaround

Our consultancy's approach:

Stage 1. Audit of the existing Maintenance system

- Maintenance Department structure
 - Organization Chart (Maintenance Department only)
 - Understanding the personnel allocation to identify areas of improvement we can assist with,
 - Assessments of modifications recently implemented or in course of implementation
- Maintenance Historical Data Availability
 - Format
 - Consistency and data reliability
 - Field & database collection
 - New database creation (if relevant)
- CMMS (Computer Maintenance Management System) audit
- Analysis old data collected
 - Further feedback and collaboration from Client is essential during this stage
- Recommendations structure plan drawn by AmmoniaKnowHow.com (AKH) team.
- Continuous improvement process (RCFA)

Stage 2: Preliminary discussions with Customer Management for Maintenance Optimization Plan implementation

- AKH present an overall, high level of Maintenance Optimization Implementation Plan (MOSIP)
- Client feedback
 - Review
 - Exchange of emails
 - Comments
 - Budget allocated for implementation

- Business model (i.e. maintenance cost per unit of product USD / metric ton of ammonia)
- AKH update the Maintenance Implementation Plan (MIP)
- Meeting to discuss the proposed modifications

Stage 3: Maintenance Optimization Implementation Plan presented. Approval by Client

- AKH present a detailed plan of Maintenance Implementation
 - Maintenance Department Structure
 - CMMS
 - Detailed equipment review (i.e. criticality analysis; FMEA)
 - New technologies or upgrades
 - Implementation of the World Class Maintenance KPI's
 - Implementation schedule
- Client's final review and comments
- AKH produce the final version of the Maintenance Optimization Implementation Plan (MOIP)
- Meetings to discuss the site implementation, allocated personnel, schedules and planning for the next stage

Stage 4: Onsite Maintenance Implementation

- The process longest in duration
- Continuous feedback from Client during this stage is required
- Modifications of the approved strategy carried out on-the-fly
- Periodic meetings

Stage 5: Acceptance Testing Audit

- Carried out post implementation and after the system is up and running
- Client's feedback of:
 - Management
 - Maintenance Department
 - Recommendations and Improvements

We focus on

We need to know what assets we have on site;
Get a clear view on their performance against targets;
Identify "bad actors" based on your ammonia and urea license type and previously collected data;
Establish equipment criticality using our fertilizer technology expertise and FIORDA data;
Asset condition has to be visible - focus of life plan development on predictive maintenance;
Standardise maintenance strategy across same items within the business;
Correct configuration and use of CMMS to drive work execution;
Create sound Planning and Scheduling systems and routines;
Develop an effective RCFA Process;
Ensure effective reporting on equipment and management systems performance.

Our Fertilizer Technology Know How

AmmoniaKnowHow.com developed Fertilizer Industry Operational Risks Database - FIORDA (www.fiorda.eu) - the first global risk register specialised in Ammonia, Urea, Nitric Acid and Methanol technologies. Currently hosting over 1500 incidents and case studies from the fertilizer industry our database grows every day. All cases are documented, assessed and risk ranked. Protective barriers and mitigation measures are recommended for each individual case.

For 2018, we estimate over 2000 incidents and near misses to be recorded in our FIORDA database covering all project phases from Design to Commissioning and Operation.

If you are interested in exploring this database and its benefits, please contact us at dan.cojocaru@ammoniaknowhow.com.

Other services include:

- Greenfield and Revamp engineering support for Nitrogen Fertilizer technologies
- Commissioning, Start-up and Operation support for Nitrogen Fertilizer technologies
- Process Safety Management and risk identification for Ammonia and Urea plants
- Development of Ammonia plants Maintenance strategies
- Ammonia plants turnaround strategy (TAR) support for operators
- Ammonia storage tank decommissioning and inspection support



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