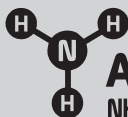


OPERATIONAL EXCELLENCE

Operation and Projects /
Engineering capabilities



AmmoniaKnowHow.com

NH₃ HNO₃ CH₃OH NPK (NH₄)(NO₃)

owned by **Fertilizer Industrial Services Ltd**

www.fertilizer.services

Fertilizer Industry Needs

- All companies in the fertilizer industry find it necessary to increase their competitive advantage by boosting their operating efficiency and reducing fixed cost.
- Continuous improvement in health, safety, environmental and quality (HSEQ) performance have resulted in increased demands and expectations from stakeholders (internal and external) for faster, safer, more reliable, more resilient and environmentally sound production.
- Effective management of assets and operations is mandatory to sustain an environmental license to operate.
- Majority of fertilizer organizations are focused on growing revenue by either increasing daily production rates from optimizing existing assets or reducing expenses and using funds for needs more urgent than operating costs.
- Regardless of an organization's priority, the ability to grow is linked directly to available budget and proven operational performance in delivering results.

Current Industry Context

- External economic factors put pressure on the industry to be more efficient and cost effective without giving any ground on HSEQ.
- Declining asset uptime - budget cuts create risks of equipment failure and production output.
- Expectation to “achieve more with less” — organizations are required to maintain margin by reducing costs and to meet stakeholder expectations,
- Cost efficiency - the cost rise of supply chain has increased the focus on loss causes.
- Operational excellence viewed from employees' perspective — when organizations focus on cost efficiency, employees may not share the same priority.

The outcome

- Organizations are forced into random cuts and slowed growth that impact long-term corporate objectives.
- Instability in achieving production targets becomes an issue, risking production revenue.
- Without continuous improvement, organizations can't capitalize on ideas and leverage leading practices.
- Organizations are required to identify savings from existing contracts.
- When organizations focus on cost efficiency, employees may view this as a decrease in capital investment and may become less engaged.

Our approach for Operation and Projects departments:

Business Management System:

We develop guidelines and necessary procedures to establish Operation and Projects / Engineering departments' workflow. These are arranged in a centralized framework and adherence is strictly enforced, ensuring all core activities for Operation, Projects and Maintenance are executed consistently and in the most effective way to sustain the transformation and achieve measurable results.

Technological Advancements:

We make use of technological advancements to improve business functions across the industry. As developers and custodians of Fertilizer Industry Operational Risks Database (FIORDA), we have the capability to extract big data and analytics, review trends of major process safety risks for ammonia and urea technologies, as well as recommending mitigation and prevention measures. Today these types of drivers we are used globally, under secure cloud computing system.

Organizational development:

We get involved in organizational development supporting organizations to define the pool of skill sets, with succession and development plans for each position, and to establish the organization as a preferred place to work. We gladly notice the rise of younger workers committed to serving a broader purpose through work beyond simple economics and their positive impact on organizational culture.

Way forward in 5 stages:

Stage 1. Audit of the existing organogram, workflow and document system as in place

- Operation and Projects team structure
 - Organization Chart (Operation and Projects Dept. only),
 - Understanding the personnel allocation to identify potential areas of improvement,
 - Level of skills, assessments, training and certifications,
 - Consistent approach: assessments of modifications recently implemented or in course of implementation.
- Review of Client inter-departmental workflow, operation procedures and internal company engineering standards and guidelines for:
 - Quality and update in line with best industry practice in the fertilizer industry,
 - Consistency and information accuracy as per company technical documentation (PFDs, P&IDs, Operating Manuals, Datasheets, parameters settings, interlock set-up, etc),
 - Field & data collection methods (shift log books, data collection software, etc).
- Document control system, company lessons learnt and process risk registers audit,
- Recommendations structure plan drawn by FIS Ltd.

Stage 2: Preliminary discussions with Client about Management structure implementation

- AmmoniaKnowHow.com presents an overall, high level plan of Operation and Projects workflow implementation,
- Client feedback:
 - Review
 - Exchange of emails
 - Comments
 - Budget allocated for implementation
- AmmoniaKnowHow.com updates the Operation and Projects Implementation Plan according to Client's feedback,
- Meeting to discuss the proposed modifications.

Stage 3: Operation and Projects / Engineering implementation plan presented. Approval by Client

- AmmoniaKnowHow.com presents a detailed plan of Operation and Projects / Engineering workflow implementation
 - Projects / Engineering Department Structure and relation with Operation,
 - Review and update of the internal standards in line with best industry practices,
 - Update and improvement of operation procedures, if required, by introducing a new set of working instruction with a clear workflow, roles, responsibilities, actions and checklists,
 - Development of lesson learn and process safety & risk registers based on Client experience, safety studies outcome (HAZID, HAZOP, SIMOPS, Incident database, etc) and our own experience in the fertilizer industry,
 - Implementation schedule presented to the Client.

- Client final review and comments
- AmmoniaKnowHow.com produces the final version of the Operation and Projects / Engineering Implementation Plan,
- Meetings to discuss the site implementation, allocated personnel, schedules and planning for the next stage.

Stage 4: Onsite Operation and Projects / Engineering Plan Implementation

- The longest duration phase:
 - Update and improve operation procedures to include job safety analysis and critical checklist to mitigate and reduce human error,
 - All HAZOP actions must be reviewed, assessed and closed with clear and proper approval system and documentation,
 - Perform training on the job and internal workshops with engineers and operators for all levels and disciplines for them to understand how the work should be performed based on correct standards and procedures,
 - We are engaged in daily operation and projects supporting operators and engineers by sharing our experience and knowhow,
 - We get involve in project execution offering engineering expertise, from past EPC fertilizer projects,
 - We organize workshops with engineers for sharing experience, learning by doing practical studies, operation optimization, parameters settings and fine tuning,
 - We offer support for closing HAZOP actions, developing engineering deliverables, and technical reports,
 - Continuous feedback is required from Client during this stage,
 - Modifications of the approved strategy carried out on-the-fly,
 - Periodic meetings.

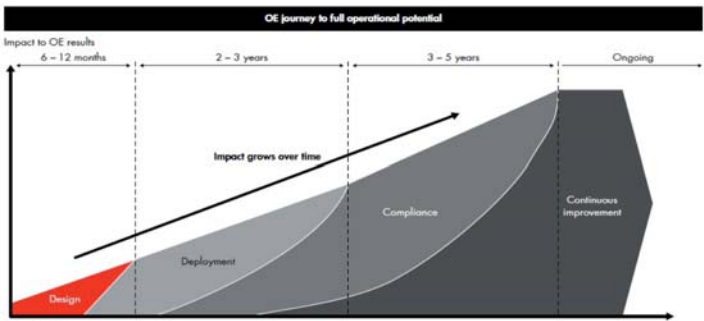
Stage 5: Acceptance Testing Audit

- Carried out post implementation and after the system is up and running,
- Client feedback:
 - Management,
 - Operation Department,
 - Engineering Department,
 - Recommendations and Improvements.

We focus on:

1. Improving base production (with no or low costs) by focus on projects that bring even small improvement in production and safety:

- Alarms and trip configuration to protect the plant
- Review of shut-down logics to allow safe stop of major equipment
- Introducing new interlocks and control loop for operational optimization
- Establishing philosophy for alarms and CSO/CSC
- Installation of safe and reliable sampling valves for proper process monitoring



2. Improving Safety in Operation and implementing projects that reduce the likelihood of Major Accidents Hazards (MAH):

- We recommend performing workshops and studies like HAZOPs, SIMOPs, Model Reviews for all plants and projects,
- For the HAZOP studies, performed correctly with the right technology expertise, the recommendations should be expected to improve Safety and Reliability in Operation and reduce the likelihood of plant trips, forced shut-down or Major Accidents Hazards,
- Some of these actions will develop into projects that may require CAPEX after an assessment and technical evaluation,
- It is recommended that the Projects / Engineering Department focuses on closing the HAZOP action with due diligence,

We can provide support and technical expertise to Client Engineering Department in closing out the HAZOP actions.

Key projects:

Ammonia Technology	Client	Location	Scope of Service
ThyssenKrupp Uhde	Abu Qir	Egypt	Revamp case study and energy efficiency program for Ammonia plant
Haldor Topsoe	PVFCCo	Vietnam	Training, operation and production optimization for Ammonia, Urea and Utilities
ThyssenKrupp Uhde	EAgrium	Egypt	Process engineering and design services for Ammonia plant
ThyssenKrupp Uhde	Maaden I & II	Saudi Arabia	Process engineering and design services for Ammonia plant
ThyssenKrupp Uhde	Maaden I & II	Saudi Arabia	Commissioning support for world largest Ammonia plant
KBR / Casale	Amonil SA	Romania	Operation support and production optimization for Ammonia plant
KBR	Mary Project	Turkmenistan	Precomm/Commissioning /Start-up Field Advisor in Ammonia Plant, 1200 MTPD, license
ThyssenKrupp Uhde	SORFERT Fertilizer	Algeria	Precomm/Comm. Start-up Process Supervisory / Advisor in Ammonia Plant Uhde 2,200 MTD license (Trains 1 & 2)
ThyssenKrupp Uhde	ENPC (Egyptian Agrium Nitrogen Products Company)	Egypt	Commissioning Supervision for 2 trains Ammonia Plants Uhde license, 1,200 MTPD
ThyssenKrupp Uhde	SAFCO IV	Saudi Arabia	Operation and production optimization for world largest Ammonia plant;
KBR	Amonil SA	Romania	Revamp, start-up, daily operation support for Ammonia plant.
ThyssenKrupp Uhde	FERTIL	UAE	Preparing process documentation for Ammonia plant for formal proposal and bidding process;
ThyssenKrupp Uhde	PVFCCo	Vietnam	Preparing process documentation for Ammonia plant for formal proposal and bidding process;
KBR	Confidential	Confidential	Operation, Maintenance and Engineering support for a fertilizer plant
ThyssenKrupp Uhde	Duslo Sala	Slovak Republic	Plant inspection and assessment for dual pressure synthesis Ammonia plant technology prior commissioning.
KBR	Amurco S.R.L.	Romania	Development of methodology of work, work instructions, operating procedures, special system of production rules and regulations for ammonia production
KBR	Confidential	Confidential	Development of risk register and ALARP Demonstration methodology

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.cojocar@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

Fertilizer Industrial Services Ltd

Venture House, Arlington Square

Downshire Way, Bracknell, RG12 1WA, UK

Phone: + 44 (0) 7494 783 534

Web: www.ammoniaknowhow.com

www.fertilizer.services

E-mail: dan.cojocar@ammoniaknowhow.com