FERTILIZER PLANTS TURNAROUND

implement best practices to improve the outcome
Turnarounds of fertilizer plants are complicated and costly events, and each day of downtime translates into the lost revenue. Mitigating the risk of cost and schedule overruns is vital to competitiveness and profitability. Turnaround teams are tasked with coordinating a limited workforce in a constrained time and must also ensure maintenance crews are safe and working only on the assets that need attention. Missing a required maintenance service or doing unnecessary work could extend the turnaround duration and increase the probability of an unscheduled shutdown after the turnaround.

**What are the top 10 reasons for turnaround failure?**

1. Unrealistic targets
2. Inability to integrate with capital projects
3. Ineffective turnaround strategy and/or turnaround teams
4. Inadequate/incapable execution organization
5. Incomplete adherence to turnaround work processes
6. Lack of resources for optimal preparation
7. Delayed process preparation and unit handover
8. Significant scope growth
9. Improper management of contractor resources
10. Quality issues at startup

Scope growth is the major contributor to cost and schedule overruns. There are three main types of work scope:

- Known scope (planned),
- Anticipated scope (can be planned),
- Discovery scope (unknown).

**Turnaround facts**

- Over 80% of turnarounds experience cost overruns
- 90% report scope growth from 10% to 50%
- Critical part method scheduling is implemented on less than 20% of all turnarounds
- Turnaround staff undergoes minimal training in modern management concepts
- Approximately 50% of turnarounds suffer schedule slippages
- Unplanned additions cost 30% to 50% more than planned work
- Cost control and forecasting are implemented on less than 20% of all turnarounds
- Over 90% of critical recommendations are never implemented
- Most turnarounds fail to meet management expectations
Implementing the best practices

1. Manage capital projects within a turnaround as one event, thus having the capital project issued for construction (IFC) documents completed before the turnaround scope freeze date.

AmmoniaKnowHow.com has the expertise to develop a Turnaround Management Procedure (Project Execution Plan - PEP) to set the parameters for the turnaround process. To achieve this, our PEP focuses on two major objectives:

   a. To execute all planned activities in a coordinated, safe and efficient manner and to minimize the production impact.

   b. To provide access to equipment and facilities for Inspection (statutory and routine) and Maintenance and Repair.

2. Utilize current asset health trends, industry data, historic events and lesson learned available in databases like FIORDA combined with technical risk analysis (e.g., failure modes and effects analysis [FMEA]) when making maintenance decisions. By using FIORDA data for ammonia, urea and nitric acid plants you benefit from the experience of different operators such as corrective actions developed under similar circumstances may be less costly than those tried in the absence of this information.

3. Another best practice is to consider replacing or upgrading equipment rather than repairing equipment during a turnaround. This strategy does not make sense for all assets, especially expensive and critical assets, like large compressors. Here, procedures like Manage Obsolete Equipment developed by AmmoniaKnowHow.com come into place helping operators managing equipment that is becoming obsolete.
Having good documentation on the best practices and potential mishaps can provide the next team of a good start for the successful turnaround. This post-turnaround discussion should be important to contractors too to ensure they deliver on expectations and re-establish working relations for future turnarounds. Developing a lesson learned register post-turnaround together with contractors will bring a wealth of benefits for future overhauls.
## Key projects:

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