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STARTUPS AND COMMISSIONING:

A CRUCIAL ASPECT FOR BUSINESS OPERATIONS

GSMR
الجمعية الخليجية للصيانة والأعتمادية
Gulf Society For Maintenance & Reliability

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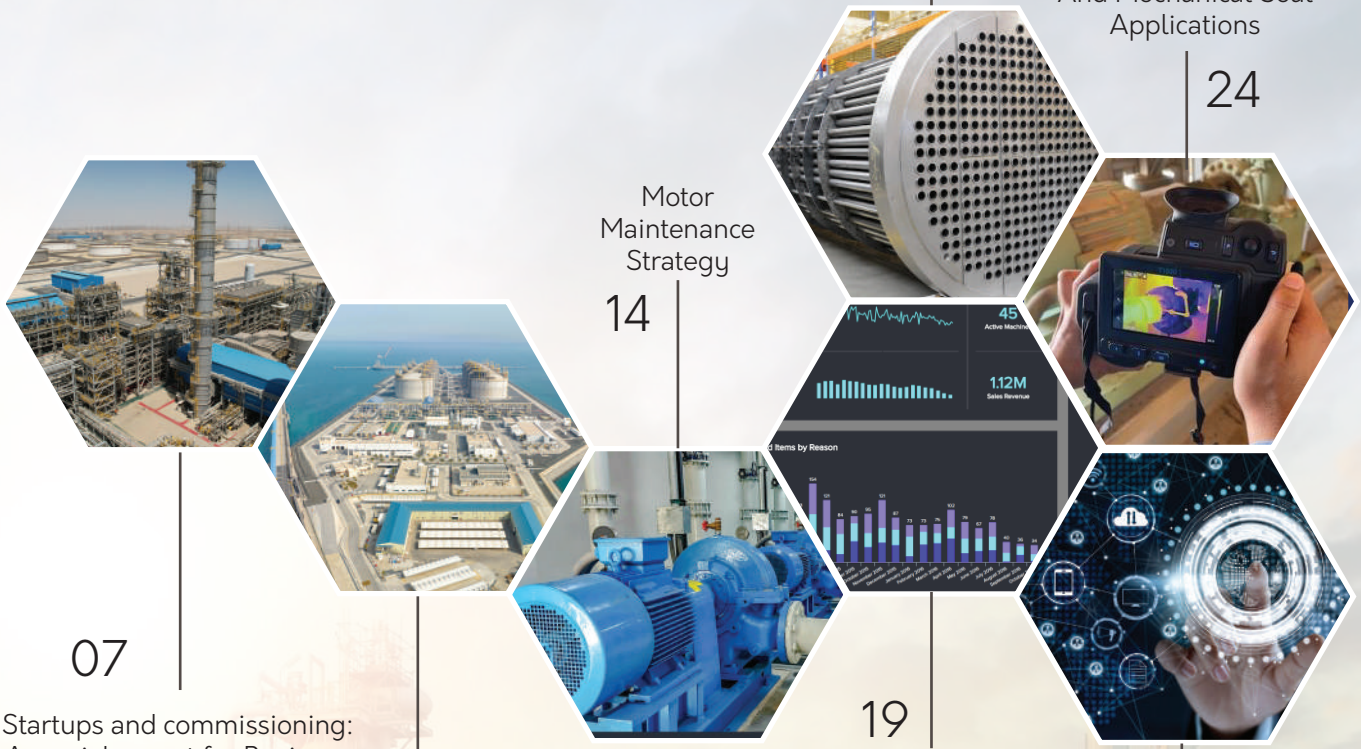

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Osool

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*READER'S FEEDBACK

Osool is a unique professional and technical magazine for the industrial world. It's been a treasured source of technology and a real experience for me. The GSMR members are professional engineers and technical experts who highly contribute to the oil and gas industry in the region. Sharing valuable time to read knowledge-sharing articles in Osool has improved my learning and will be an experience for new engineers and technicians.

- Meshaal S. Al-Azmi, Saudi Aramco

Osool magazine is one of GSMR's best initiatives and has contributed to my knowledge expansion. It features articles (written or authored) by professionals from maintenance, reliability, and asset management. This magazine provides an outstanding platform for sharing knowledge and best practices, making it a valuable resource for me and its readers.

- Mohamed Al Ibrahim, Saudi Aramco

Osool is a must-read magazine, and I highly recommend it to all professionals involved in maintenance, reliability, asset management & digitalization. It reflects the GSMR committee's endless efforts to promote and excel in the field of maintenance and reliability within the Gulf region. Professionals from distinct sectors and diverse expertise contribute towards developing best practices and knowledge-sharing, and this has helped me stay updated with the latest technology within the field.

- Naser M Al-Qarni, A SABIC Affiliate

ChairmanSpeak

Dear GSMR Members,

Belonging to GSMR family is truly an honor, which upholds core values while striving to promote maintenance, reliability and asset management across society. Engineers are allowed to participate and share their valuable knowledge with the community and spread its awareness. GSMR reflects on the views of its members and evaluates them, thus introducing new ideas that incorporate society and working professionals.

With the advancement in technology, new ideas and views have helped us achieve our goals as a society. Bringing in new changes and endless possibilities in maintenance, reliability, and asset management has motivated professionals to grow, nurture, and share their knowledge with others. GSMR encourages young talents to participate, by providing them with a platform that listens to their inner voice.

New collaborations have come into existence to enhance the user experience of GSMR members while incorporating access to various events related to maintenance, reliability, and asset management. Building off the success of the recent GSMR-PDO Technical Dinner in Oman, GSMR plans on organizing similar events soon.

It gives me immense pleasure to witness professionals from within the industry, contribute towards the development of society by organizing activities that uplift engineers. GSMR believes in equality and thus encourages women in the industry to showcase their talent and skills. Leading women professionals participate in WIAM to bring excellence in performance for women professionals, as well as to enrich society at large.

GSMR's recent participation in the Global Water, Energy, And Climate Change Congress opened doors to professionals seeking societies for the upliftment of their careers. Being part of such an outstanding society that encourages both students and working professionals alike to follow their passion is truly remarkable and makes GSMR standout from its competitors.

I thank every member for their participation and incredible skills that have taken GSMR to new heights. With our positive goals and endless possibilities inspiring me, I look forward towards an enthusiastic participation from our young talents. Together we look forward to serving the community by turning new perceptions into realities.

Saad Ibrahim Al Shamrani
Chairman
Gulf Society for Maintenance & Reliability

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CELEBRATING OUR

SECOND ANNIVERSARY

MESSAGE FROM

The Editorial Team

Essa Al Qattan

Editor in Chief, Kuwait

As Osool Magazine celebrates its second year, I am grateful for the shared expertise and insights that have shaped our publication. Your support has been vital. Looking forward, we're excited to continue providing valuable content that advances on Maintenance, Reliability, and Asset Management. Thank you for being part of our story. Here's to another year of growth and innovation.

Dr. Wesam Beitelmal

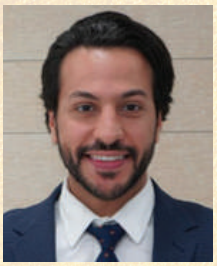
Contributing Editor, Oman

As we celebrate our second anniversary, your unwavering support is gratefully acknowledged. Two years of diverse topics has enriched meaningful dialogues in our engineering industry. We look forward towards continuous growth and creating memorable connection with you, our readers. Thank you for being a part of this journey.

Latifah Al Qallaf

Editor, Kuwait

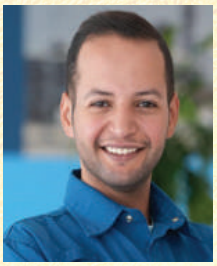
Working as part of the editorial team for Osool has been extraordinarily gratifying. We are able to create a unique platform to promote knowledge sharing, development, collaboration in the Gulf. Not only is every issue packed with exceptional technical knowledge, but every issue has an interactive competition and an out of the box book review. We will continue to try our best to give our readers a unique 360 experience with little bit of everything.



Yousef Al-Harbi

Editor, Kuwait

It has been very honouring, exciting, and incredibly fulfilling to work with the Osool editorial team. As a team, we were able to brainstorm and establish special forums to encourage corporation development information throughout the Gulf region. One of the exciting parts is knowing there is an issue and getting different solutions through knowledge exchange, and that's the beauty of knowledge sharing. Last but not least, Osool is an outstanding platform for problem-solving and creativity, a flawless description of engineering.



Faleh Al-Ajmi

Editor, Kuwait

Working as an editor in Osool has been an honor. It's a great experience to be part of this journey, and provide insights on best practices from several individuals. We aim to put forth many such technical articles regarding maintenance, reliability and asset management.

Riya Kanade

Managing Editor, Bahrain

It's an honor to be part of the Osool Magazine which celebrates the diversity in Maintenance, Reliability, and Asset Management. We strive to highlight unique perspectives, recognize accomplishments, and share inspiring stories. We are committed to delivering quality content that will make a positive impact in the lives of our readers, and look forward to sharing stories of our community.

Mohammad Behbehani

Editor, Kuwait

Being a part of Osool has been both enriching and inspiring. I've had a wonderful experience contributing to Osool, where I've had the opportunity to explore the dynamic world of oil and gas companies and witness the cutting-edge innovations that drive the industry forward.

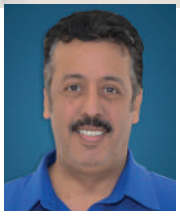
Shaymaa Ashkanani

Editor, Kuwait

Marking our second year at Osool Magazine, we celebrate the milestones achieved and the knowledge shared within the world of maintenance, reliability, and asset management. Your support and contributions have been the cornerstone of our success. As we step into another year, we restate our promise to bring you the forefront of industry innovation and insight. Thank you for joining us on this enlightening journey.

STARTUPS AND COMMISSIONING:

A CRUCIAL ASPECT FOR BUSINESS OPERATIONS



Mohammad Fahad Al-Ajmi
Manager Operations, Al-Zour Refinery
KIPIC

1. Could you provide a brief introduction about yourself, including your background and experience?

I am Mohammad Fahad Al-Ajmi, Manager at Operations Group Al Zour Refinery, working in Refinery Operations for the last 33 years. My career began in the KNPC Refinery Operations Department, having worked in various positions in the refinery unit, such as the Sulphur Recovery Unit, Gas Treating, H-Oil units Hydrogen, Crude, and reformer units. In 2017, I joined KIPIC Al Zour Refinery as a Team Leader Operations, handling HPU/SRU, and ARDS/HOC units, and was promoted to Manager Operations in 2021.

2. What is the role of the operations department in the commissioning phase of the refinery?

The operations group plays a significant role in the Commissioning and Operations of the Refinery units. We ensured the participation of our key members at various stages of the refinery project, right from the Engineering design phase, alongside attending the review meetings of plot plans, process flow diagrams, process engineering flow diagrams, alarm objective analysis, HAZOP and SIL Reviews, OTS Model and FAT reviews, ICSS Review and model review (30%, 60%, and 90%).

The early identification of flaws & modifications made during the reviews of the design stage has been very beneficial in the subsequent stages of the refinery commissioning & start-up. Before the commissioning of the refinery, the Operations Team actively participated in the Pre-commissioning activities such as mechanical clearance, flushing/cleaning of piping/equipment, hydro testing, and box up. Once the Pre Start-up Safety Review (PSSR) has been completed, the control & supervision was transferred from the Project Team to the Refinery. During Commissioning, Operations played a major role in the beginning of the facilities by leading

multidisciplinary teams in the startup of the facilities and ensuring the safety of their personnel and assets.

3. How does the operations team contribute to the successful startup of the refinery, and what are the best practices and key success factors?

The training of the workforce was the major challenge, as the operations team had newly recruited engineers and PAAET Operators as a paramount force; along with its experienced staff from KNPC Shuaiba, Mina Ahmadi (MAA), and Mina Abdullah(MAB) refineries. A structured training program was put in place that helped in successfully commissioning the refinery with safety.

Various best practices were followed by the operations group, the most significant being the Commissioning & Start-up Program (CSU). CSU program was initiated in 2019 to establish good coordination between project and owner teams to closely monitor its progress from the project state till the refinery was commissioned. CSU Program is a multidiscipline structured approach to plan & execute the CSU activities delivered by commissioning teams and led by the operations team leaders.

The lessons learned from the Clean Fuel Project (CFP- MAA/MAB) commissioning furthermore helped in successfully commissioning the Al Zour refinery. Subject matter experts from the operations and maintenance team shared their experiences with the operations staff and conducted several interactive meetings. Moreover, commissioning and startup document preparation are considered as major factors in the successful commissioning and startup.

4. Could you share some lessons learned during commissioning and startup from the operations perspective?

Numerous lessons were captured and communicated to our staff during the Commissioning and Start-up phase, some of them being.

a) Participation of multidisciplinary teams in project engineering reviews minimized the flaws at an early stage of the project.

b) The HSE Transition plan was developed before the Commissioning and Startup to ensure a safe transition of the facilities from projects to owner group.

c) Deployment of commissioning support services contract for the support of the workforce and skills requirements during the commissioning and startup.

d) The enthusiasm from the operations staff through various training programs, including Operations Training Simulators (OTS).

e) The willingness for documentation by dedicated experts and multidisciplinary teams.

f) Meetings / Workshops with KNPC MAA/MAB Refinery teams to collect the best practices/ lessons learned from CFP and implemented in Al Zour Refinery commissioning.

g) Establishment of CSU Program.

5. Could you mention the challenges faced during the commissioning process and how were they overcome?

Generally, for a project of this size, numerous challenges are expected, with some of them being stated below. The Al Zour Refinery project phase was with 5 EPC packages under 5 EPC Contractors. Coordination among these EPC Contractors was one of the prominent challenges faced. Sourcing of workforce and their training were another challenge, carried out professionally based on their knowledge and experience. The Operations Training Simulators (OTS) training was imparted to the employees which enhanced their readiness in the control rooms for the refinery Operation.

The operations staff training programs were executed through the International Training and Competency Development Consultant by

developing refinery unit-specific training programs. Enormous documentation was to be developed for the Commissioning and Startup, which were well coordinated by experts from their respective fields. Another major challenge was the COVID-19 pandemic, which affected the availability of vendors/consultants/licensors at the site. The recruitment plans were also affected during this time.

6. Share with us your upcoming plans or vision for operating KIPIC Refinery.

We plan to continue the operations of Al-Zour Refinery in the safest, most efficient, optimum, and environmentally friendly manner to produce high-quality products through a professional and competent workforce to accomplish organizational goals, satisfying the needs of the customers and stakeholders. The operations group's vision is to achieve a leadership position in Refinery Operations in the Gulf region by adopting the industry's best practices, optimum utilization of resources and assets, and production of quality products through developing a competent workforce and building an HSE culture.

7. What are the key takeaways you would like to offer to emerging professionals?

Competence is a crucial factor determining the success of any organization. As young professionals, they need to focus on competency and thereby improve their skills and knowledge to create high quality and efficiency at work.

Another aspect is to have a strong commitment to their work. They need to be agile learners, able to adapt and learn new things quickly in a new fast-changing environment. Raising the Competency and commitment levels of employees can help in achieving their tasks and goals effectively and also contribute to the safe and efficient operation of the refinery.

They also need to develop strong communication and team-building skills as it drives better results for individuals, teams, and organizations. Finally, Professional and Personal development is very important as it can make them better employees and create opportunities for career growth.

Al Zour LNGI Terminal:
A great potential for Kuwait's energy sector

Mohammed Fahad Al-Otaibi
Manager Operations LNGI Group
KIPIC

1. Tell us about yourself and give us a brief about the activities you're involved in.

I'm Mohammed Fahad Al-Otaibi, Manager of Operations LNGI group at KIPIC Al Zour LNGI Terminal, Kuwait, having successfully commissioned the world's largest LNGI terminal in July 2021. Various milestones achieved under my leadership include a Marine Operation service level agreement with KOC, a six-year Operation and Maintenance contract, and successful commissioning and provisional acceptance. Moreover, I'm involved in the company's digitization project.

2. How is the State of Kuwait addressing its rapidly growing energy demand, and what role will the new 'Kuwait LNG Import Terminal' at Al-Zour play in enhancing the nation's gas infrastructure and export capabilities?

Kuwait is addressing its rapidly growing energy demand by establishing a new 3000 Bbtu/day LNG import terminal at Al-Zour. The terminal will supply clean fuels and natural gas to generate electric power, meeting the needs of the local markets and other natural gas consumers. This decision aligns with the strategic plan of Kuwait Petroleum Corporation (KPC). The terminal will also contribute to increased exports, helping mitigate the effects of the world energy shortage. The Kuwait LNG Import Terminal is a crucial contributor to Kuwaiti energy security.

3. How has KIPIC integrated environmental protection measures at the LNGI terminal, and can you detail some of its major eco-friendly initiatives and how they benefit society?

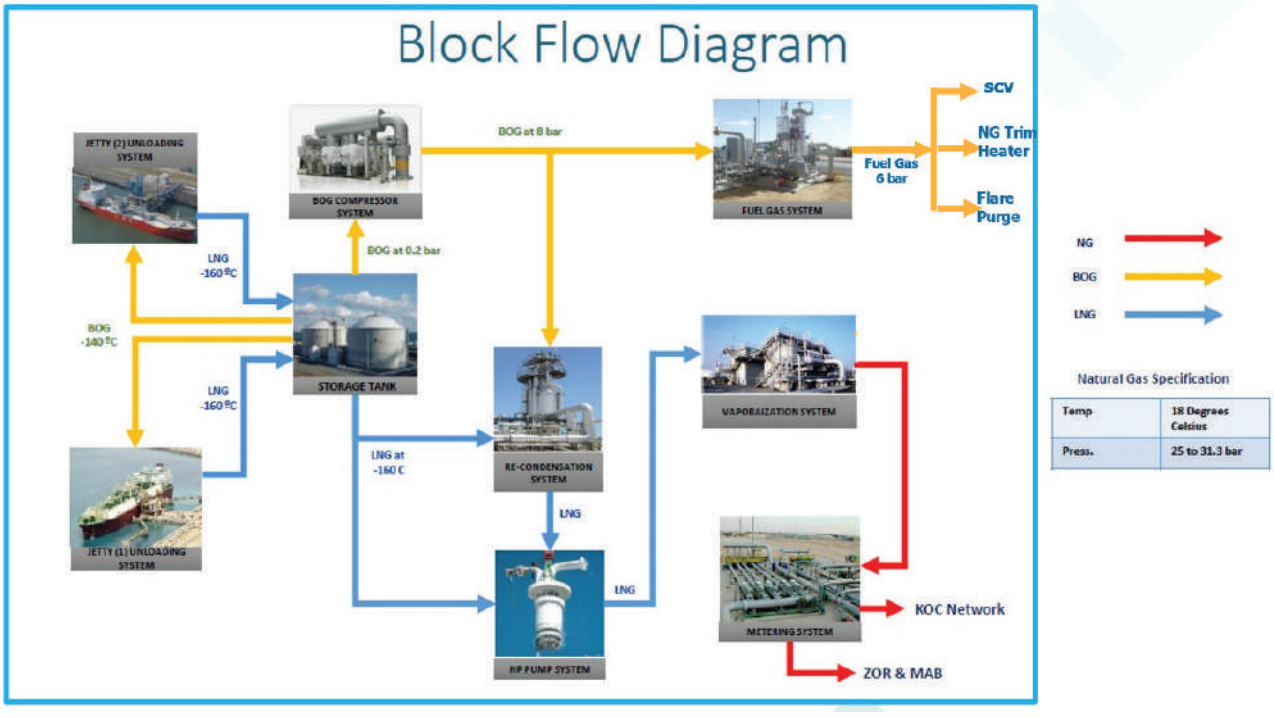
KIPIC is a pioneer in the LNG industry, integrating environmental protection measures and eco-friendly initiatives to ensure sustainability. A detailed Environment and Social Impact Study (ESI) was conducted to identify the environmental impact and develop mitigation and management measures. Key measures include air emission monitoring, wastewater monitoring, hazardous material management, solid waste management, noise measurement and control, emergency response plans, oil spill contingency plans, and labor camp management.

Eco-friendly initiatives include zero flaring during normal operations, preventative maintenance procedures, secondary containment/bunds, an inbuilt wastewater treatment plant, and LDAR (Leak Detection and Repair Program). The facility is designed to minimize fugitive emissions by minimizing flange joint & maximizing weld joint as well as by Selection of full containment LNG storage tanks with outer concrete walls and concrete roof. The facility has been built with impounding basins to avoid spills passing the terminal fence and waters. KIPIC seeks reliable equipment with high operational flexibility and low maintenance work through quality assurance, modular design, preventive maintenance, training, and vendor partnerships. They are committed to minimizing GHG emissions and leaving no residue in case of a spill.

4. Could you provide a comprehensive overview of the operations and processes involved at the LNGI facility, from receiving the LNG freight to its integration into the national gas grid?

The LNGI facility is a facility that receives, stores and vaporizes LNG from cargo ships, sending it as Natural Gas (NG) to the existing gas network. The process includes the LNG unloading system, carrier loading system, storage system, compression system, recondensation system, reactor and high-pressure pumping system, vaporization system, metering system, fuel gas/natural gas system, and recirculation lines.

The facility is prepared to receive LNG from carriers and pump it to the storage system, which was designed to minimize heat ingress. The produced gas (boil-off gas) is withdrawn to avoid pressurization and compressed for use. The excess is then sent to the condenser for recovery. The LNG is pumped out



of storage tanks using low-pressure pumps, partially used to condense the BOG, and then vaporized and metered before being sent to the gas network at the required temperature and pressure.

5. Could you shed light on the start-up and commissioning process of the facility? What are the key steps, challenges, and measures taken to ensure a smooth and safe transition to fully operational capacity?

The start-up and commissioning process of an LNGI facility involves several critical steps to ensure a safe transition to fully operational capacity. These include pre-start-up activities, mechanical completion, cold commissioning, pre-start-up safety review meetings, hot commissioning, performance testing, operational testing, and safety drills and training.

Pre-start-up activities involve finalizing engineering designs, procuring equipment, constructing the facility, and completing safety and regulatory assessments. Mechanical completion ensures equipment and systems are correctly installed and connected. Cold commissioning tests individual equipment without involving LNG. Performance testing validates regasification capacity, pressure and temperature control, and emergency shutdown systems.

LNG facilities face challenges due to their technical complexity, safety and environmental concerns, regulatory compliance, supply chain management, and human resources. Technical complexity involves complex cryogenic and fluid handling systems, while safety measures and containment systems are crucial. Regulatory compliance requires thorough documentation and strict guidelines. Supply chain management is very complex, especially during peak usage periods.

The start-up and commissioning process of an LNG import and regasification facility involves a series of steps to ensure a smooth transition to fully operational capacity. These include thorough testing, effective communication, risk assessment and mitigation, an emergency response plan, adequate operator training, continuous monitoring, quality control, and stakeholder engagement. These measures help identify potential issues, address safety hazards, and ensure the facility's reliability and operational success.

6. Could you share an example of a challenge faced during the commissioning process and how was it overcome?

The Kuwait Integrated Petroleum Industries Company (KIPIC) successfully commissioned the first LNG terminal in the country, overcoming challenges such as the second wave of Covid 19, resourcing experienced manpower, training employees, visa requirements, communication protocols, and unloading the world's largest LNG carrier. The team's innovativeness and creativity kept them moving, and on 12th July 2021, the first tanker carrying the first shipment of liquefied natural gas arrived at the Mina Al Zour Port. The LNGI terminal was commissioned, operational, and stabilized, pumping natural gas into the central gas network. The team's motivation, enthusiasm, determination, and knowledge contributed to the successful completion of the project.

7. What plans hold in the future for KIPIC?

Kuwait's KIPIC LNGI is well-positioned to capitalize on future business opportunities in third-party storage, bunkering, and road shipments of the LNG. The global growth in LNG is driven by international strategies for transitioning to low-carbon energy, with many countries considering it as a stepping stone towards net-zero targets. Future technologies could involve fuel oil conversion to valuable petrochemical products, natural gas use for hydrogen generation units, LNG use in power stations, and integration of LNG-fuelled power generation with intermittent renewable power.

8. What are the key takeaways you would like to give to emerging professionals?

Emerging professionals should adopt a lifelong learning mindset, build a strong professional network, be adaptable, develop communication skills, cultivate problem-solving, demonstrate a strong work ethic, master time management, exhibit professionalism, develop leadership skills, be open to feedback, embrace challenges, build a powerful personal brand, seek mentorship, prioritize self-care, and set long-term goals for career success. These takeaways should be adapted to individual circumstances and aspirations.

MOTOR MAINTENANCE Strategy

Younes T. Al-Sayed-Hasan
Electrical Reliability Engineer
Sea Water Injection Dept.
Saudi Aramco

Introduction

Electrical machines (motor and generator) are one of the most essential inventions of mankind. The basic principle of such invention is to exchange electrical and mechanical energy, by the electro-magnetic field, that was invented by American inventors Thomas Davenport and Emily Davenport in 1837. The small electric motors are the prime driver of our daily-life devices, ranging from kitchen appliances, water pumps, all the way up to Electric Vehicles (EV).

Due to its rugged and simple construction, the three-phase motor is the heart of the industrial plant processes, that drives almost all types of rotating equipment, such as pumps, compressors and fin-fans.

The traditional practice of maintaining such equipment that works on scheduled-time intervals (Preventive Maintenance) is not adequate, due to a high number of sudden failures that could cause catastrophic process interruptions, along with an expensive motor repair.

At the present time, Condition Monitoring techniques for such rotating equipment leads to be the dominant practice, since it proves to predict failures ahead of time. Consequently, the reliability and planning teams can prepare a plan to overhaul the motor and procure the necessary spare parts before its collapse.

This article points out the procedures conducted to predict performance of electrical motors in terms of winding temperatures, vibrations, current imbalances, etc., that will sustain the decision of overhauling faulty motors by a repair agency.

Major Faults in Induction Motor

Several surveys concluded the faults in most motors occur due to stator, rotor and bearings failure as distributed below:

Bearing related	:	40 - 41%
Stator related	:	30 - 38%
Rotor related	:	8 - 10%
Others	:	12 - 22%.

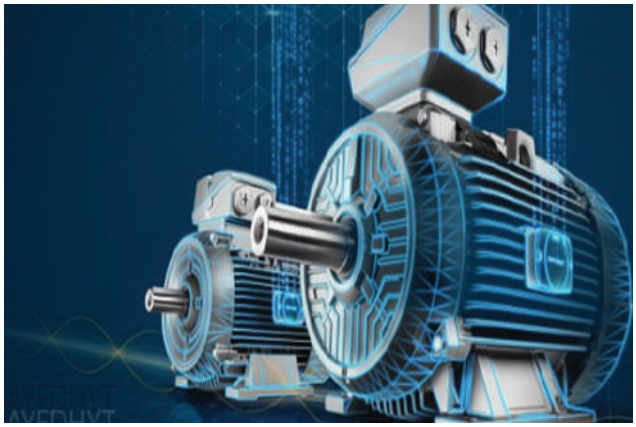


Figure 1: *Typical Electrical Motor*

Therefore, an intensive focus on the above-mentioned areas is a must, to exhibit a strong motor reliability program.

Plant Motor Assessment

A comprehensive assessment by the Reliability Engineers was performed to reveal the real condition of the plants critical motors, rated 500 Horsepower and above. Scope and results of such evaluation is as shown below:

Historical Data Review

The following operational parameters of the running motors were evaluated to reveal any abnormality:

Bearings temperature: Evaluation of bearing temperature trend can be helpful to discover bearing condition such as shortage or contamination of lube oil.

Windings temperature rise: Stator winding temperature rise is defined as the increase over ambient temperature of the winding due to motor energizing and loading. This is a very effective way to evaluate winding condition. It is measured by the installed Resistance Temperature Detectors RTD's. The maximum allowable temperature rise for the normal operating motor is 63 °C.

Current imbalance: This parameter will indicate integrity of the windings' insulation or connection in one of the coil assemblies. Current and voltage readings for each phase can be taken from the motor control panel display.

Shaft or Bearing Housing Vibration: Vibration measurement is one of the regular monitoring systems for mechanical protection. Limitation of motor shaft displacement is defined by API STD 541 and API STD 546.

Previous Maintenance Records, Results of the following off-line tests Maintenance records were used for the motor assessment:

- **Winding Resistance:** Winding resistance can be the symptom of coil damage, shortage, or removal of the connection. Winding resistance should be adjusted at the reference temperature. Moreover, phase imbalance for the windings shouldn't exceed 1%.
- **Insulation Resistance:** Insulation resistance test is one of the routine tests in periodical maintenance. The test shall be held in accordance with IEEE 43.
- **Polarization Index:** To evaluate the condition of winding insulation, such as a growth of voids in the insulation, Polarization Index (PI) test shall be carried out at DC5000V according to API STD 541 and API STD 546. In API standard, acceptance criteria for new motors shall be not less than 2.0.

Most of the readings of the parameters above were extracted from Plant Information Software and trended for the past two-years period, as shown in figure 2:

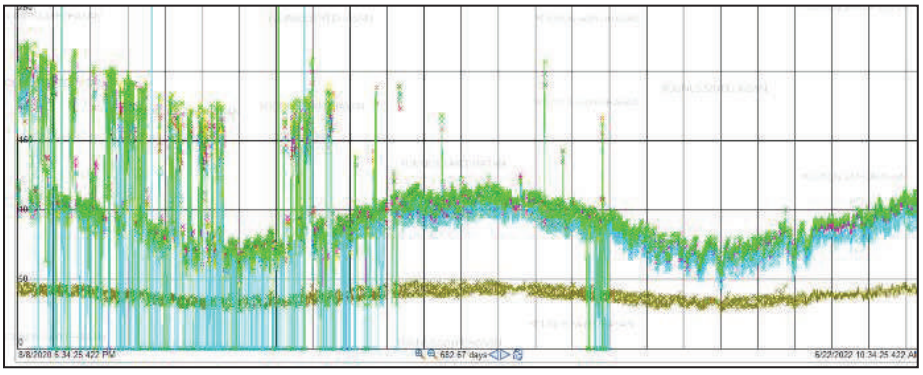
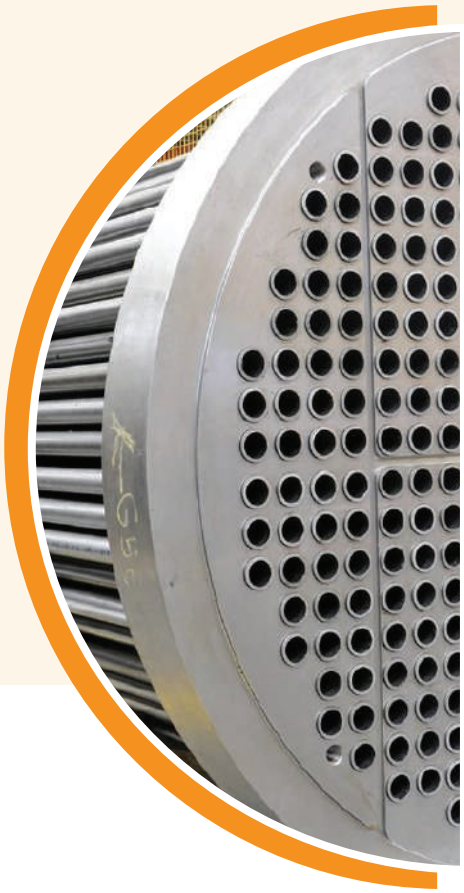


Figure 2: *Typical Motor Winding Temp. Trend*

Findings and Recommendations

All the readings were found within the acceptable tolerance, except for 2 induction motors which had higher vibration levels in comparison with the other typical motors. Normal vibration level is around 1 mil, while it is around 2.5 – 2.7 mils for the two defected motors. Keep in mind that the vibration alarm level is 3.0 mils.

So, it was recommended to remove the 2 motors and send them for inspection and overhaul prior to its sudden failure.



Integrity of Tube-to-Tubesheet Expanded Joints in AIR COOLERS

Amr Elsayed
Corrosion Engineer
Saudi Aramco

INTRODUCTION

PROCESS BRIEF

Amine Regeneration Unit is designed to remove the H2S from the rich amine streams of existing refinery absorbers. Hot lean amine from the base of the amine regenerator flows through lean/rich amine exchanger where it is cooled. It is then pumped to the lean amine header for distribution to the amine absorbers.

BUNDLE ASSEMBLY

Lean amine cooler: Air cooler finned tubes with induced fans. Each of the two bundles are combined in one unit bay with two induced fans for each bay, making it a total of four bundles.

MATERIAL OF CONSTRUCTION

As per design, bundles are made of Carbon steel – Hydrogen-induced cracking (HIC) resistant material.

DESIGN CONDITION

The design operating temperature will be inlet 93.1 °C and outlet 55°C.

FAILURE BACKGROUND & INSPECTION FINDINGS

Failure reported for two combined bundles at the Tube-to-Tubesheet Expanded Joints of the outlet Header Box (Floating Header Box), while the other two bundles were okay.

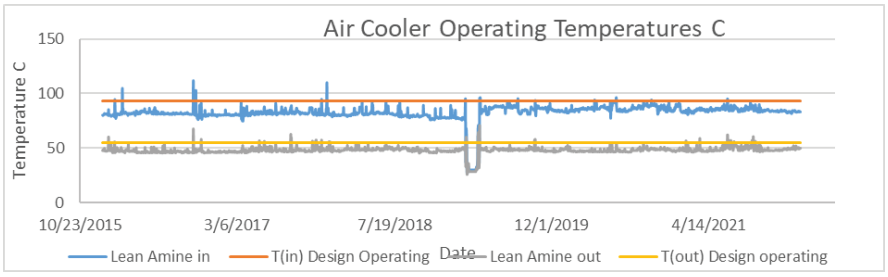
A few years later, further failures were reported for another combined bundle at a similar location: Tube-to-Tubesheet Expanded Joints of the outlet Header Box (Floating Header Box). No major thinning, pitting nor significant cracks were found. Hence tube rolling and plugging were conducted for the affected tubes. Tube inspection by IRIS & MFL revealed no rapid thinning in the tubes, with a minor corrosion rate.

OPERATING CONDITIONS

While reviewing the operating parameters, it revealed that there is no major deviation in temperatures or pressures. Both are within design limits.

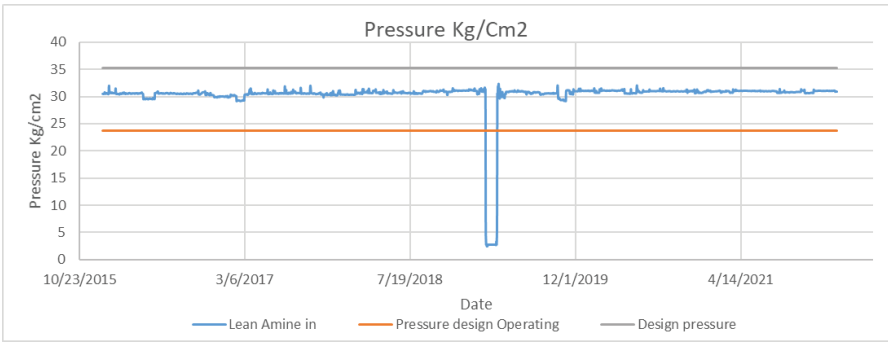
1. Temperature

The rear header is operating at a safe temperature.



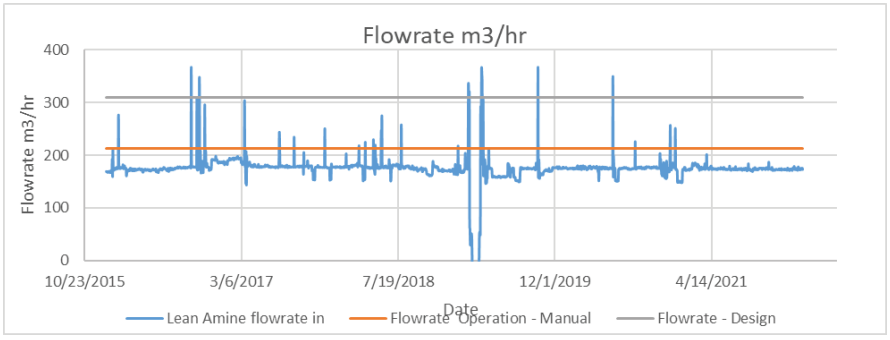
2. Pressure

No major changes noted in pressure and is still within the design limits.



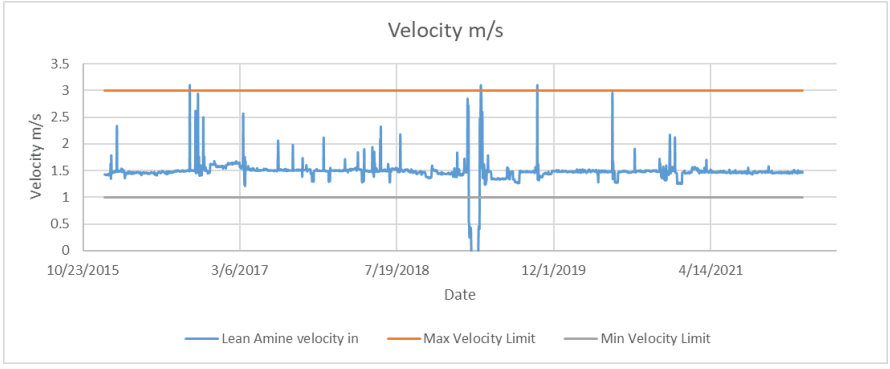
3. Flowrate

Amine flowrate is within the design limits most of the time, with no prolonged deviations.



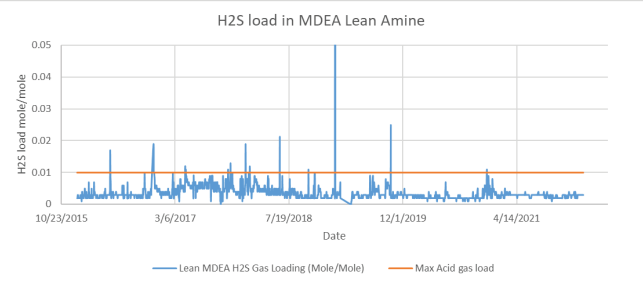
4. Velocity

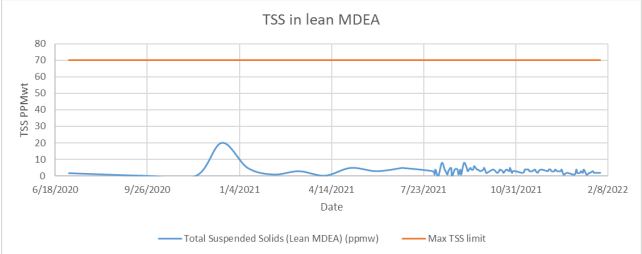
Velocity is measured based on the number of passes and tubes per pass. Corporate has set a recommended maximum and minimum velocity limits, 1-3 m/s, for lean amine service to control amine corrosion and prevent sludge build-up and under deposit corrosion, respectively. Amine velocities in the passes were found within the design limits most of the time with no prolonged deviations. Velocity of lean amine is continuously monitored by IOW.

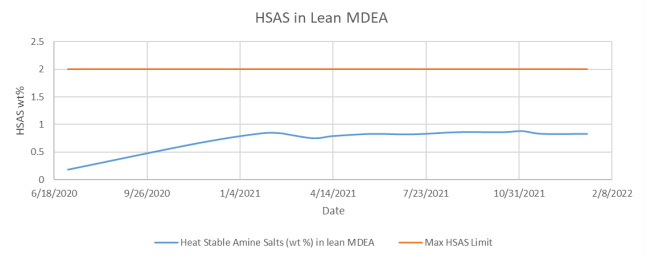


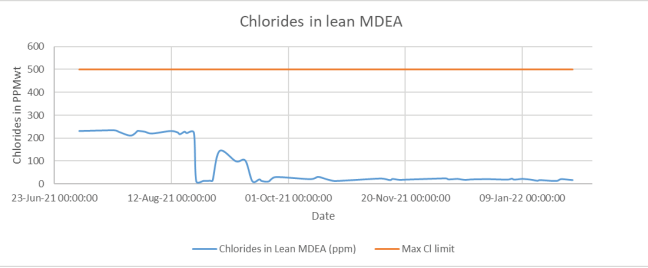
FLUID COMPOSITION

The service fluid is lean MDEA amine 30-40 (%wt). Reviewing the corrosive content of the fluid revealed that there is no major deviation in their concentration from the recommended limits.









Damage Mechanism and Risk Based Inspection (RBI)

The equipment has been evaluated as part of a Risk Based Inspection study and found a low corrosion risk level based on the thickness measurements, operating parameters and fluid chemistry.

Due to the recent inspection findings, the potential damage mechanisms have been evaluated.

Loose joints are always at the same tube end (rear header) regardless of flow direction change for each pass and temperature.

Mechanical Fatigue (Vibration-induced Fatigue)

It has been noticed that the impacted Tube-to-Tubesheet joints are always in rear (floating) headers of two bundles of the same bay that are subjected to the same fans with no major thinning, while the other bundles were okay. **Tube-to-tube sheet joints suffered from loose expanded joints.** Thus, it is expected that it may be driven by the fan vibration; as per data provided by Rotating Equipment Unit; a relatively high vibration was reported a few years before the inspection reports on the loose expanded joints.

CONCLUSION

Fan vibration may affect the integrity of Tube-to-Tubesheet Expanded Joints in induced draft air coolers. As per international standards & RBI, there are no set values of tube vibration that will be acceptable or unacceptable under all conditions, so experience with using and interpreting vibration data is required to set a vibration limit mainly for induced draft air coolers to protect their tubes. As for the rotating equipment unit, the trip limit for vibration is 0.5 in/sec. Vibration levels above 0.13 in/sec RMS seems to have a bad impact on expanded joints within five years in service as per inspection results. This limit is aligned with the requirement of API-661 for air-cooled heat exchangers, structural members shall be designed to minimize vibration. The maximum amplitude of vibration over the design fan-speed range should be 0.15 mm (0.006 in.) from peak to peak, as measured on primary structural members and machinery mountings.

ONLINE ANALYZER CHALLENGES

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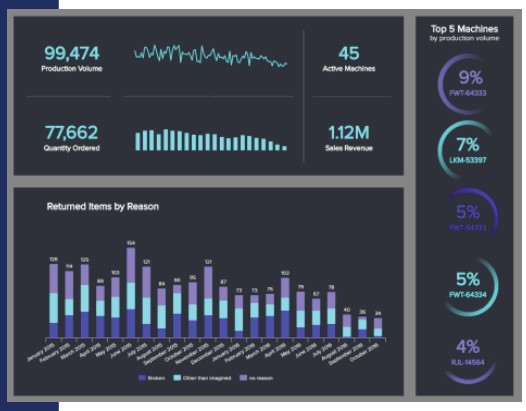


Petrochemical, Oil & Gas, and other industries in the energy market work efficiently, continuously, and safely with proper assets of different technologies in place.

The assets and its technology's purpose is:

- **To monitor and control the process.**
- **To maintain safety for the assets in different plant units, personnel, and the community.**
- **To achieve the highest quality of products.**
- **To comply with Environmental Regulations.**

But how are we going to manage these technologies efficiently facing challenges that inhibit the assets from performing their maximum function, driving the highest quality standard? First, we must know what are the challenges that surround these manipulation and management of the asset technologies. In this article, we will capture one of the sets of assets responsible mainly for Safety, Product Quality, Process Monitoring & Control, and Environmental Compliance – the Online Analyzers!

In my experience of +15 years in the Industry, I observed many challenges that are critical in the achievement of organization goals. The Top 5 challenges that were observed were:

(1) **Lack of Criteria and procedures in conducting preventive maintenance (PM) Strategy intended for online analyzers.**

(2) **Incorrect Man-hour provision in computerized maintenance management system (CMMS).**

(3) **Under/Over Manpower.**

(4) **Improper utilization of Manpower.**

(5) **Lack of confidence of Analyzer Customers – other departments.**

These challenges are interconnected, and if we resolve the issue from its very root, we can provide proper management of these assets, delivering maximum results for the organization. Thus, it is very important to rectify the root of the problem.

THE ROOT CAUSE

Lack of defined criteria and procedure for conducting PM Strategy intended for Online Analyzers is the key cause. There are many factors to consider in resolving this issue, as we are looking at required man-hour for PM of each analyzer, required PM frequency, and most importantly the manpower requirement because of criteria provision. There are subfactors in each factor considerations that will make the requirement well responded, solving the very root of the challenges.

CRITERIA AND ITS SUBFACTORS

The man-hour requirement for online analyzer asset, we consider the following:

(1) The type of analyzer.
(2) Analyzer cycle time.
(3) Validation and calibration.
(4) Tapping points.
(5) Number of streams.
(6) Sampling system and its components.

These factors are considered in order to provide proper man-hour for maintenance activities to be performed, especially the number of streams and cycle time, example for Gas Chromatography (GC), which has a complex manipulation and servicing of components during preventive maintenance. Take note that most GC applications are for product quality control, environmental, etc.

For the required frequency of PM, we consider the following factors:

(1) Analyzer manuals.
(2) History of maintenance.
(3) Risk reports.
(4) Bad actor analyzers.
(5) Sensor replacements.
(6) Safety, product, and process criticality.

It's very important to refer to manual and Original Equipment Manufacturer (OEM) for newly installed assets in the plant for the provision of PM frequency. For existing assets, it is important to gather data, such as history of corrective maintenance, consideration of sensor for replacements, and answering the question, Is it a bad actor? The Risk Report will be an advantage to present and analyze the data for reference and will help in decision making.

For the determination of correct manpower requirement for the PM schedules, with corresponding man-hour and PM frequency in it, we must consider the Total PM Work Hours for the whole year (performing job) or Total Technician Hours, in which we consider maintenance time (PM and Corrective Maintenance CM), Leave benefits (Annual Vacation, Sick and Emergency Leaves), and Non-maintenance time (administrative, training, and personal relief time). Incorporating all these factors in the provision of manpower, it will give an accurate number of technicians who will perform the PM and CM of online analyzers, along with the supervision of the supervisors and guidance from Analyzer Asset Engineer.

THE PROCEDURE

First, define the criteria. Then, the Analyzer Engineer (Asset/Reliability Engineer) needs to collect the 4-5 years of CM records, existing PM Frequency, and existing man-hour for each analyzer from CMMS and maintenance execution records. A risk report is then prepared based on the data gathered. The Analyzer Asset Engineer then calls a meeting with Supervisors, Senior Technicians, and the Manager to discuss the data interpretation. In the meetings, they must decide in amendment of the PM Frequency and Man-Hour from existing data, based on the set criteria. After amendment, manpower requirement will be calculated and again, the Asset Engineer will call for a meeting with supervisors, specialist, and manager to discuss the impact of manpower requirements. Any changes will be recorded, and the asset engineer will prepare the forms required for the amendment of the number of man-hour and frequencies. The changes will be concurred by the Operations Department, Asset Management Department and Planning Department. Once the forms are approved, the authorized planning personnel will reflect the amendments on CMMS whether it is SAP, Maximo, or Oracle. After the changes, the Analyzer Asset Engineer is required to monitor the performance of analyzer assets on a monthly basis. After one year, the engineer will evaluate or assess the effectiveness of the PM Strategy.

Considering the above criteria and procedures will result to an accurate provision of correct number of manpower who will manage the asset technologies yielding to maximum benefits for the organization. Some of these benefits are improving Analyzer PM Strategies, Analyzer Reliability improvement, Analyzer Asset Life Assessment improvement, reflecting correct Man-hour on SAP, Alignment of PM Frequency as required, Provision of correct number of Technician required, boosting confidence of Analyzer Customers (Operations, Process, EHSS) and most importantly achieving organization objectives to maximum.

Furthermore, we must also consider other strategies to be in place such as spare parts management (SPM), sensor replacement strategy (SRS), calibration gases and consumables management, analyzer asset maturity identification, obsolescence management etc. For as long as we have the right number of manpower to perform the job, especially technicians and supervisors, plus the competent maintenance and reliability engineer to manage the assets, we can always support the organization towards total safety, quality, and excellence.

REVOLUTION TO

DIGITALIZED MAINTENANCE AND ASSETS MANAGEMENT

Ali I. Al-Hamdan
Abqaiq Plants Maintenance
Department Manager
Saudi Aramco

Asset maintenance concepts and applications have been evolving over the years due to the remarkable technological and industrial advancements in this field. Such concepts have become part of the "Industrial Revolution 4.0" and digital transformation evolution towards leveraging data with a tangible widespread, fast pace across the industry bringing new perspectives. For several decades, various tools and techniques have been introduced to shift the maintenance approach from reactive to predictive, and then proactive based on artificial intelligence and machine learning capabilities. In light of all these rapid changes and new directions in the field of maintenance, having essential infrastructure and strategy are key success factors that require the maintenance leader's full focus.

PILLARS OF A SUCCESSFUL MAINTENANCE-TECH TRANSFORMATION

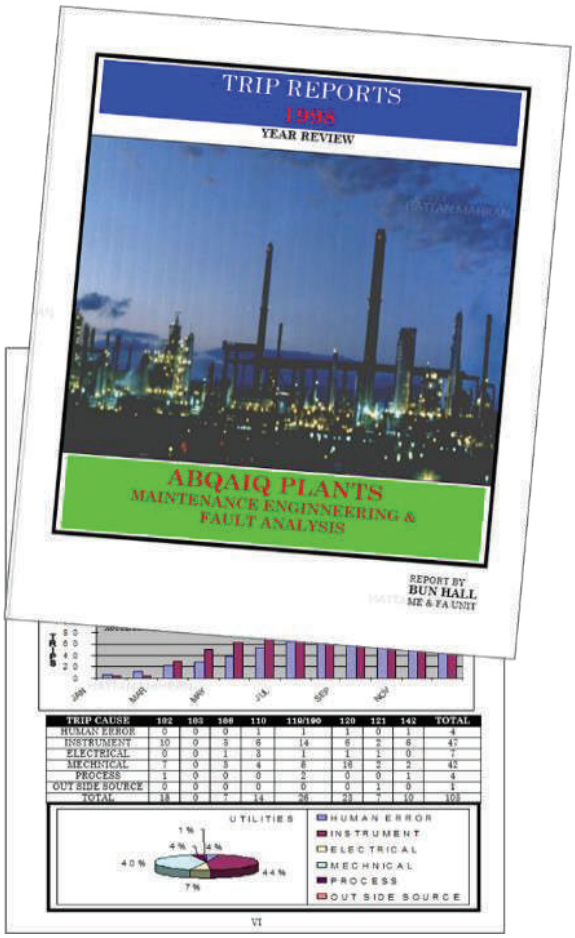
Investing in technology adoption and implementation has become one of the major common directions by maintenance and reliability leaders. However, this approach remains imperfectly understood and linked with the digital transformation. To generate perceptible business value out of the anticipated digital transformation, the organization should have a clear defined vision for the future of maintenance and reliability function and its expected outcomes.

An organization should streamline the transformation efforts into two main focus areas, which are the establishment of digital work management and the investment in predictive and proactive maintenance strategies. It is crucial to guide the future vision and resource investment decisions by the main enablers of the aforementioned transformation, which are systems infrastructure and capabilities, as well as the cultural change of maintenance and reliability staff.

Abqaiq Plants' Journey Towards Digital Transformation

Saudi Aramco's Abqaiq Plants has been taking the journey of digital transformation by introducing various strategies and programs to predict equipment failures, increase labor productivity, and streamline efforts to address the plant's reliability improvement opportunities.

Abqaiq Plants' structured reliability journey started in the 1990s, with the inception of the reliability unit at Abqaiq Plants. It was one of the oldest reliability units in Saudi Aramco and was responsible for upgrading preventive maintenance programs, conducting reliability assessments, failure investigations, and essential vibration analysis. During that period, majority of efforts were arranged in the reactive mode of reliability, which is expected at the infancy of reliability introduction and preceding the start of asset management. The next stage was to transition all reliability efforts from reactive maintenance modes to proactive modes, to optimize maintenance cost and downtime.



Moving towards proactive maintenance, in the early 2000s, vibration and lubrication condition monitoring programs were developed. The vibration program had the goal of ensuring machine health and detecting early signs of failure, while the lubrication program ensured the lubricant's health through regular lab testing. To further strengthen our reliability position in proactive maintenance, continuous efforts were exerted in exploring advanced technologies and new means, which resulted in the development of two new predictive maintenance strategies, the thermal imaging and ultrasound programs.

Thermal imaging is not a new technology, it is being used for several applications, in industrial and non-industrial fields. However, Abqaiq Plants explored this technology to detect failures in rotating equipment and enrolled it as part of a periodic maintenance strategy. Therefore, an innovative approach was established back in 2019 to detect the health of mechanical seals through thermography scanning, which was successfully deployed for the first time in the industry. On the other hand, Abqaiq Plants capitalized on ultrasound technology to collect frequency data from bearings and perform benchmark analyses with a healthy baseline to detect failures at an early stage.

To ensure sustainability and achieve the optimum benefits of these new developments, several measures were established to focus on the robustness of the implementation and the quality of these programs.

1 The development of internal procedures to identify roles, responsibilities, and scope boundaries. In addition, a reporting mechanism was established for every technology adapted systematically.

2 A new database was established to include data being collected from Predictive Maintenance technologies with a healthy baseline for all targeted equipment setting a benchmark.

3 The development of reliable staff with the needed competencies through training certification in Predictive Maintenance.

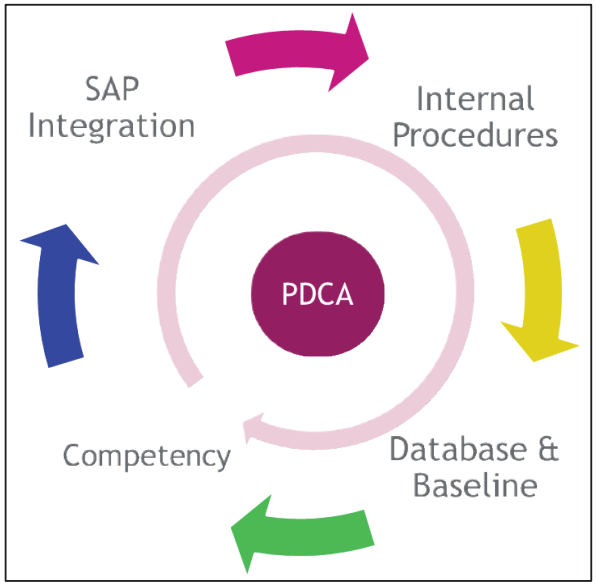


Figure 1: *Plan, Do, Check and Act (PDCA) Framework adopted by Abqaiq Plants Maintenance Department to focus on the robustness of the implementation and the quality of all deployed reliability programs*

4 The integration of the aforementioned Predictive Maintenance programs in the "Computerized Maintenance Management System" to ensure the completion of activities in a timely and cyclic manner and to generate required proactive recommendations through the "Failure Reporting, Analysis, and Corrective Action System" database.

5 Conducting annual assessments on all new programs, to identify realized benefits, areas of improvement, and enhancement opportunities.

As improvement is a never-ending process, Abqaiq Plants is constantly shifting the failure prediction paradigm and maximizing the use of IR 4.0 tools. This started with the establishment of a solid infrastructure that centralizes the data collection from scattered field systems to direct the analytical efforts to a centered hub with analytical capabilities. Furthermore, the infrastructure enables the incorporation of ongoing corporate efforts of adopting advanced machine learning and artificial intelligence tools for failure predictive analysis.

After launching the advanced technological capabilities in failure predictive analyses, Abqaiq Plants is an integral part of the corporate inelegant efforts aiming for the overall reliability enhancement in all Aramco's operating facilities. In addition, this will enable us to capitalize on the dynamic monitoring and reporting efforts availed in the center. The ultimate goal of this path is to develop a reliability forecast to sustain plant safety and dependability while enhancing our planning efficiency and consequently conducting more cost-effective maintenance practices.

PATH FORWARD

Along the pathway of changes and improvements in asset maintenance since the early years to date, the use of new IR 4.0 technologies has been very effective. The IR 4.0 technologies involving digital transformation and the effective management of reliability data are vital parts of the transition towards better effective maintenance strategies. It's based on reliability data to minimize maintenance costs and improve equipment availability. On the other hand, having defined the infrastructure required to achieve a digital transformation in maintenance, and showing resilience to adapt to new emerging technologies is a fundamental factor for reliability leaders in the upcoming years.

Figure 2: *Failure Prediction Through Industrial Revolution 4.0 to anticipate potential failures or equipment breakdown*

ABQAIQ PLANTS THERMOGRAPHY PDM PROGRAM ON ROTATING EQUIPMENT AND MECHANICAL SEAL APPLICATIONS

ABSTRACT

Thermography is a predictive maintenance technique that can be used to monitor plant machinery, structures, electricity and systems. This device has been present in the market for a long time; however, over the years it has developed its capabilities and characteristics due to the expanding areas of its use. Saudi Aramco-Abqaiq plants team has got the advantages of a reactive tool (thermography camera) to be used as a predictive maintenance tool. The aim of this program is to predict the pumps and mechanical seal failures at an early stage by periodically inspecting the health of seal piping plans. The program officially began in 2021 and is still being conducted for 217 applicable equipment's every three months. It's viewed as a very useful program because it protects the mechanical seals from any further damage, therefore decreasing the outages of the plant's assets.

Keywords: Predictive Maintenance, Infrared Thermography Camera, Mechanical Seal, Reliability Technical Alert, Key Performance Indicators.

INTRODUCTION

Infrared Thermography is a predictive maintenance technique that can be used to monitor plant machinery, structures, electricity, and system. It's the science of detecting infrared energy emitted from an object, converting it to an apparent temperature, and displaying the result as an infrared image, captured by a thermal camera. The captured image is then analyzed and diagnosed to determine it's operating conditions by detecting thermal anomalies.

Among the seven Electromagnetic waves, the infrared radiation (IR) is located between Visible light and microwaves in the Electromagnetic Spectrum. IR frequency ranges from 30 to 400 THZ, therefore being invisible to the human eye, however it can be felt as heat.

Thermography has a lengthy history, yet its popularity has skyrocketed in the previous years, due to its diverse industrial uses, such as checking the condition of electrical motor internal windings and switchboards, verifying the quality of steam system components and steam traps functionality, diagnosing misalignment of mechanical power transmission components, and identifying the tanks condition and level. Another discovered use of this amazing technology is it helps to monitor the mechanical seal of the plant's pumps.

Abdullah Ali Al Fenais,
Reliability Engineer
Saudi Aramco Company

What's a Mechanical Seal?

Overview and Function of Mechanical Seal

Mechanical seals are utilized in conditions where sealing is important between a rotary shaft and a static housing. It's designed to preserve fluids inside of the rotating equipment while the equipment's shaft is freely moving, to stop any leakages in its surroundings. In the rotating equipment, Mechanical seal is considered as the most reliable sealing device when compared to other traditional services. It's main goal is to ensure the pump is able to operate without having any leakages or issues to the surrounding. When choosing the types of mechanical seals for the pumps, it is crucial to consider many factors such as: fluid type, operation pressure, operation temperature and material.

Mechanical Seal Piping Plans

Mechanical seal is always associated and conserved by seal piping plans, which are systems/plans used to ensure the good condition for the mechanical seal operations as well as improving the pump's reliability and safety of the facilities by keeping the seal faces lubricated, to avoid any damage and continuously draining the acceptable and not acceptable seal leak in a safe way. Mechanical seal plans come under four categories: Primary, Secondary, Containment and Gas seal plans. Each category is associated with many seal plans, which is selected based on operational and environmental factors that can be found in detail on API 682.

Program Assessment

As part of Abqaiq Plants reliability unit of continuous efforts to ensure the maintainability and reliability of the plants' assets, the team conducted an assessment for all critical pumps to identify all causal factors associated with pump failures and outages and then come up with significate solutions and recommendations mitigating the most contributed factors. The assessment results show that the highest number of pump outages is due to mechanical seal failures caused by deficiency and blockage in seal piping plans. Therefore, a team was developed for the Predictive Maintenance (PdM) thermography program to periodically inspect the mechanical seal piping plans (flush and drain lines) for any blockage or abnormalities.

In 2020, the program started as a trial to establish the technology baseline, number of equipment and program frequencies. Determining the number of pumps under the programs radar were chosen considering three important factors: pump criticality, product media and seal plan type. Selecting an optimum frequency period for the program was established by continuous yearly inspection on the agreed list of equipment's, until the minor accumulations/blockages in the seal lines could be noticed. After this, the team agreed to go with a minimum time period as a conservative decision. Therefore, the assessment resulted in having a program that covers 217 equipment, inspected every 3 months.

Startup and Outcome of the program

The developed PdM thermography program is performed by a certified infrared thermography employee who checks the health of the seal piping for the specific critical pumps' mechanical seal, report any abnormalities such as piping blockage, and then issue reliability technical alert report to repair the findings. This alert letter is always sent to the operation team, and contains the findings and list of recommendations to avoid any such event from future reoccurrence. This effective program is becoming a part of the plant's maintenance strategies, where it is marked "overdue" in the system if it is not being conducted on time, therefore it badly affects the plants desired Key Performance Indicators (KPI) accordingly. (Refer to Figure.1)

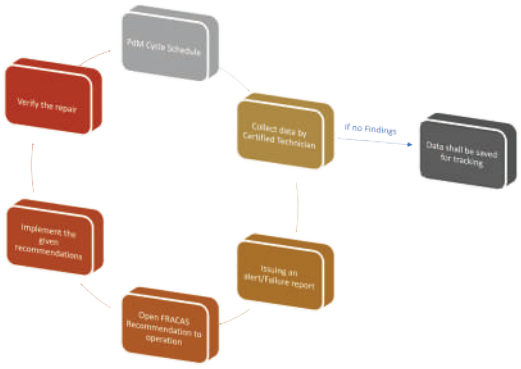


***Figure 1**.PdM Thermography Program Cycle Process.*

The program was officially started in 2021. Since the beginning of the program, 29 alerts have been issued. If an alert is issued, it predicts that a mechanical seal is forecasted from being damaged at an earlier stage, since the mechanical seal is very sensitive and can instantly get damaged due to inadequate lubrication and coolant. The team calculated the cost avoidance for such a program to be about $800,000 excluding other significant costs, such as labor maintenance cost and production loss cost. Basically, the cost avoidance has been calculated by adding the cost of purchasing new mechanical seals for all 29 alerts, knowing that the seal would be damaged if it was not predicted at an early stage.

Thermography PdM program task steps

Prior carrying out the PdM task, the collector shall ensure selecting the appropriate camera settings such as scanning range, and material emissivity. Also, the collector shall ensure that the target size is within the spatial measurement resolution of the camera. In addition to that, the collector shall minimize the errors caused by other sources such as background reflections, to have good quality pictures. Following are the steps given below:

1. Collect the required seal images for the machines on online mode

Collector should coordinate with the operations team to schedule the machine on running mode while collecting the required sealing lines picture, in order to monitor the continuity of the lubricant in term of temperature difference across the mechanical seal. (Refer to figure. 2)

Figure 2.*Collecting image for machine on online mode.*

2. Check the collected images for any clogged or abnormalities

Pictures should be collected precisely based on the camera setting requirements. Multiple pictures from different locations shall be taken of blocked systems for better troubleshooting. In case a high amount of accumulation particles are blocking the seal lines, thermography collector is responsible to immediately inform the operation team to shut down the machine and do the required repair, while the thermography alert will be issued and published accordingly.

(Refer to figure. 3)

Figure 3. *Collected Picture for Blocked Seal Piping.*

3. Download images and information to the program data base for reporting and tracking purposes

All collected data, even the good condition cases shall be uploaded to the PdM database to be used in future reporting and tracking purpose in case of any failure or difference in reading in the coming cycles. This data is saved by date and time of collection, equipment SAP number and name plate tag number. (Refer to figure. 4)

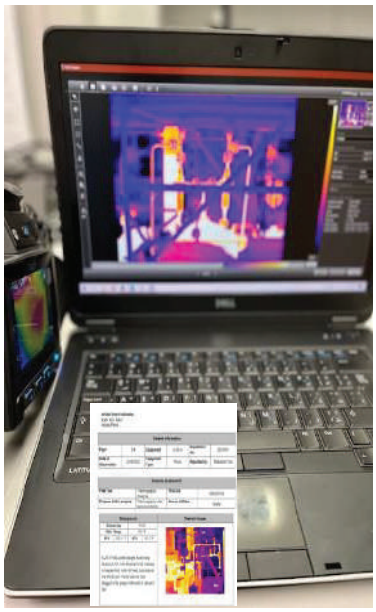


Figure 4*.Uploading data into the program Database.*

Program benefits

Ultimately, the thermography PdM program clearly minimizes the plants' seal failures related to lubrication, therefore lowering potential increase in plant expenses. Since it's very useful with impressive tangible results, Abqaiq plant team is currently expanding the number of equipment's under this program, as well exploring the utilization of this thermography in different applications such as: Inspecting steam traps and monitoring the integrity of the electrical loop connections.

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A PANEL DISCUSSION ON THE ROLE OF ASSET MANAGEMENT IN

OPERATIONAL EXCELLENCE

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The Gulf Society for Maintenance & Reliability (GSMR) in partnership with Petroleum Development Oman (PDO), held its first successful "GSMR-PDO Technical Dinner" on 7th August 2023 at the W Hotel, Muscat, Sultanate of Oman. The event was led by GSMR professionals and Nasser Toqi, PDO Functional Maintenance & Integrity Manager. It provided a unique opportunity for Maintenance, Reliability, and Asset Management (MR&AM) professionals in Oman and across GCC countries to network, connect, and share expertise. It also marked the renewed collaboration of the Oman Society of Engineers with GSMR.

Attendees at the GSMR-PDO Technical Dinner at Oman

Over 60 MR&AM professionals attended the technical program from diverse sectors in Oman and GCC, with a panel discussion followed by Q&A. The panel discussion focused on the significance of Asset Management in achieving Operational Excellence. It aimed to demonstrate the challenges of implementing Asset Management and its benefits and facilitate the exchange of ideas by sharing best practices in MR&AM.

Asset Management realizes its value from the use of assets. ISO 55000 defines an asset as an 'item, thing or entity that has potential or actual value to an organization'. Asset Management is defined as "the coordinated activity of an organization to realize value from assets". It involves the development of a desired balance of performance, cost, and risk to achieve organizational objectives.

The concept of Operational Excellence originated from Dr. Joseph Juran in the 1970s and was applied initially in lean manufacturing. Organizations have evolved and adapted a business mindset, strategy and/or philosophy in a way that uses certain principles and tools, such that a culture of excellence is achieved within the organization to deliver long-term sustainable growth and improved business performance. Therefore, Asset Management serves as a vehicle for Operational Excellence towards the delivery of business goals.

Husain Al Ali, GSMR Training & Education Committee Chair stated that Asset Management in the GCC started in the oil and gas industry, being the most capital-intensive industry in the region, with other sectors following suit. The health sector still needs a lot of catching up to do but is moving in the right direction as discussed by Eng. Faiza Al Zadjali, GSMR Board Member.

Andrew Worthing, PDO Maintenance Management Systems Team Lead highlighted the benefits of ISO 55001 certification as a testament to PDO's achievement in 2019. The certification provides credibility and assurance to organizations in implementing an effective asset management system. It identifies and mitigates risks, and provides suitable business processes. Consequently, this provides a competitive advantage and enhances the organization's reputation.

Assets, however, are not only limited to physical assets. It even includes people, as emphasized by Zaid Al Habsi, PDO Functional Maintenance and Integrity Execution Team Lead. Asset Management will not be effective if the people tasked to craft and deliver it are not competent. These talents must be developed and nurtured for sustainability.

Asset Management in the GCC is projected to grow by $500 Billion by 2026 – a 25% growth increase from the end of 2022. This growth needs to be supported by an effective Asset Management system. Modernization triggered by the era of the 4th Industrial Revolution and variation away from oil in the GCC poses opportunities and threats. Automation and digitalization enhance productivity and efficiency, and open doors for job creation. Diversification unlocks new growth areas and offers challenges in the production and growth of asset's life-cycle management.

Business objectives are accomplished through a culture of Operational Excellence. However, Operational Excellence is a journey, and Asset Management can accompany your organization to fulfill this journey.

Panel Discussion with Husain Al Ali, Zaid Al Habsi, Andrew Worthing, and Eng. Faiza Al Zadjali, moderated by Teddy Tabanao.

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Discover ways to integrate passion with profession renowned Athlete!

Saleh Almuhaini
Senior Engineer
Research & Technology
KIPIC

1. **Tell us a little bit about your journey so far.**

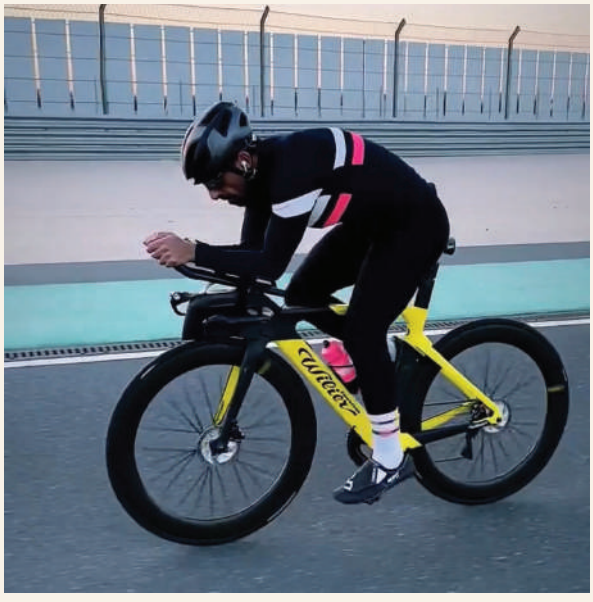
   My name is Saleh Almuhaini and I'm a Mechanical engineer who graduated from Kuwait University in 2011. I joined KNPC in 2012 as a maintenance engineer and moved to KIPIC in 2017 as a design engineer. I started my Triathlon Sport journey in 2017 and was selected to represent the Kuwait Triathlon National team in 2019. I have participated in more than 30 races locally and internationally.

2. **What in the oil and gas sector attracts you?**

   As a freshly graduated engineer, I think the oil and gas sector is a dream for many engineers, as it represents the implementation of what we have studied in the university, and it's the field where you can witness all of your theoretical equations come to life.

3. **What obstacles did you face in the oil and gas about your sports career, and how did you overcome them?**

   Triathlon is a demanding sport that requires you to spend a lot of time in training. While working 8 hours as an engineer, and conducting intense training sessions to boost your performance, it has been a challenge. Once you learn to organize your day, with priorities given to your work, training, and sleep schedule, everything aligns on its own. The secret to my success as an engineer and as a professional triathlete is time management.



4. **How did you combine your work and sports career without sacrificing the quality of your work?**

   Arranging my time in a way that comprises my 8 hours at work and a minimum of 2 hours of workout, I was able to work on my goals. Whenever I intend to perform in any race, I plan my leaves in a way that does not affect my job or the task at hand while I'm away. I believe incorporating a

sports lifestyle with your engineering career is tough, though achievable if your targets for your career in sports and at work are well-defined.

5. What is your advice for newly joined employees in the oil sector?

Due to my ability to successfully blend my recreation and work since 2017, my suggestion to all would be to find a balance between their work and recreational activities. If there are hobbies that add value to your mental or physical strength, ponder on methods to overcome the challenges. Don't find excuses related to work or ways to cease your interest at heart. Gradually make efforts to incorporate it with your daily schedule at work.

6. How can you benefit from your sports journey at your work?

As my sports journey has been about endurance and mental strength, these qualities are easily reflected in my personality. I believe the Triathlon has taught me not to give up and instead focus on 1 direction until the very end. This in return has helped build my personality that can further be valuable at my workplace as an engineer.

7. How do you handle self-doubt?

At any level in your work career or sports journey, there will always come a moment when you doubt your decisions. I consider doubts to be healthy, as they ignite the fire that pushes you to achieve your goals. But remember, the moment you doubt yourself is the moment you are ready to go to the next level in your journey with adequate hard work.

8. Describe some difficult decisions you had to make to get where you are now.

Regarding my work, I was always comfortable at KNPC and knew the daily challenges and ways to overcome those challenges. My decision to move from KNPC to KIPIC while having 5 years of experience in the maintenance field, was to experience a different career path altogether. I decided to join KIPIC as a Project Engineer and will never regret this decision, as it provided me with various opportunities and helped me reach where I am today.

About my Triathlon journey, the toughest decision I had to make was in regards to changing my coach. At that time, my coach had been training me since the beginning of triathlete days to help me qualify for the most challenging races in the triathlon world. After working with him for almost 5 years, there came a time when I felt it was time to change my coach and decided to move on to new challenges that awaited me.

My undying passion for Triathlon and my work motivates me despite any stress.

Hussain Mahmoud Ali
Instrument Maintenance Engineer
KIPIC

1. TELL US A LITTLE BIT ABOUT YOUR TRIP SO FAR.

Of course! I'm Hussain Mahmoud Ali, an Instrument Maintenance Engineer working for KIPIC. I graduated from California State University - Chico and joined KNPC in 2015, with a transfer to KIPIC in 2017. I was introduced to the sport of Triathlon by Saleh Almuhaini in 2018, and ever since felt a deep connection to the sport. Having participated in numerous events, I'm representing the Kuwait Triathlon National team.

In this regard, I would like to share my recent experience with the race held in Lahti, Finland. I had the privilege to participate in the Ironman 70.3 World Championships, by earning my qualification slot in Astana, Kazakhstan. It was a great experience, and securing a spot in this prestigious event wasn't easy. The race was challenging, with every kilometer testing my physical endurance along with my mental strength. The terrain, weather, and the sheer intensity of racing against world-class athletes made it a formidable challenge. Yet, it was these very challenges that made the experience so enriching.

Overall the journey has been remarkable, filled with challenges and personal growth, like a testament to my dedication and passion for the sport of triathlon.

2. WHAT ABOUT THE OIL AND GAS SECTOR ATTRACTS YOU?

The oil and gas sector holds a remarkable allure to me due to its complexities, continuous learning, sense of accomplishment, and optimized working environment. The industry is ever-evolving, making it a challenging field that pushes individuals out of their comfort zones. The need for constant knowledge about extraction technologies, environmental regulations, and market dynamics drives professionals and has helped in my personal growth. Accomplishments in this sector have given

me a unique satisfaction and contribution towards the world's power.

3. HOW DID YOU COMBINE WORK AND LIFE WITHOUT SACRIFICING THE QUALITY OF WORK?

Balancing a demanding work schedule with my Triathlon training hasn't always been easy. I'm committed to two daily training sessions, one before work and the other after. What I've learned from Triathlons is discipline, focus, and efficiency, essential elements that are a part of my work. I prioritize pressing tasks and use tools like smart Excel sheets for time-intensive tasks.

My second training session is after work, transitioning from professional to personal life. I prioritize spending quality time with my family, ensuring a work-life balance. I believe effective time management is crucial for achieving this balance.

4. WHAT SHOULD EMERGING YOUNG TALENTS CONCENTRATE ON?

Young talents should focus on their capabilities, consistency, holistic development, and networking. Perseverance and dedication are the keys to success. They should also balance academic studies and other necessary skills required. Networking with coaches, attending training camps, and participating in events related to their talent can provide valuable insights and broaden their horizons.

5. WHAT KEEPS YOU GOING, AND HOW DO YOU DEAL WITH STRESS?

My undying passion for Triathlon and my work motivates me despite any stress. Self-encouragement, time management, and proactive measures have helped me cope with stress. Maintaining a resilient mindset, positive self-talk, and breaking problems into manageable tasks can provide relief.

6. WHAT ERRORS DO YOU WISH YOU COULD HAVE PREVENTED?

I regret the moments I spent doing nothing when I could have invested in myself. The value of time is immeasurable, and I now realize the opportunities I might have missed by not capitalizing on my younger years.

7. HOW DO YOU HANDLE SELF-DOUBT?

To overcome doubts, I set clear goals and work diligently toward them. Furthermore, breaking down tasks into manageable ones allows progress and momentum. Reminding myself of individuals who have achieved similar goals empowers me to strive and maintain a positive attitude.

8. DESCRIBE SOME DIFFICULT DECISIONS YOU HAD TO MAKE TO GET WHERE YOU ARE NOW.

Being a Triathlete while working full-time in the oil and gas sector has been challenging. One challenge was limiting socializing with friends, as it affected my resting period and training the following day. Another challenge I faced was the discipline in waking up early and mentally preparing for intense workouts. Despite the physical discomfort, the long-term benefits and end goal helped me stay focused.

WIAM
WOMAN IN INDUSTRY & ASSET MANAGEMENT | GSMR

"Together we nurture, mentor and empower the community."

MISSION

- We believe in bridging the gap and providing opportunity to communities to create inclusive workshops and societies.
- Collaborate with communities to create a knowledge-sharing environment that encourages professional growth.
- Organizing events to promote and celebrate women from diverse sectors.
- 1:1 engagement platform for MR&AM connecting local and global industry experts.

ABOUT WIAM

The MR&AM industry is undergoing a significant transformation, thanks to the contributions of women professionals. These women possess unique perspectives, skills, and diverse backgrounds, making them highly valued in the industry. In 2018, the Women in Industry and Asset Management Committee (WIAM) was formed to recognize these pioneers and promote diversity in workplace environments. GSMR supports WIAM, fostering robust communities and providing equal opportunities for women in diverse industries. The WIAM Committee celebrates the contributions of women pioneers and advocates for its focus on empowering women and enhancing diversity within the workplace.

EVENT SNIPPETS

MEET AND GREET

The Annual General Assembly 2023 in the Kingdom of Bahrain

The Strategic Planning Council Meeting held at GSMR Headquarters

GSMR officials during a special visit to the Oman Society of Engineers headquarters in Oman

WORKSHOP & TRAINING

The Holistic Physical Asset Management Workshop & CAMA Exam held for Saudi Aramco professionals at Khobar

MEMORANDUM OF UNDERSTANDING

An MoU between GSMR and Oman Society of Engineers during the GSMR-PDO Technical Dinner.

GSMR and Ibn Al-Nafees Hospital signed an MoU to facilitate collaboration for expansion.

CONTRIBUTION TOWARDS SOCIETY

GSMR at the Orientation week for freshmen students at College of Engineering at University of Bahrain

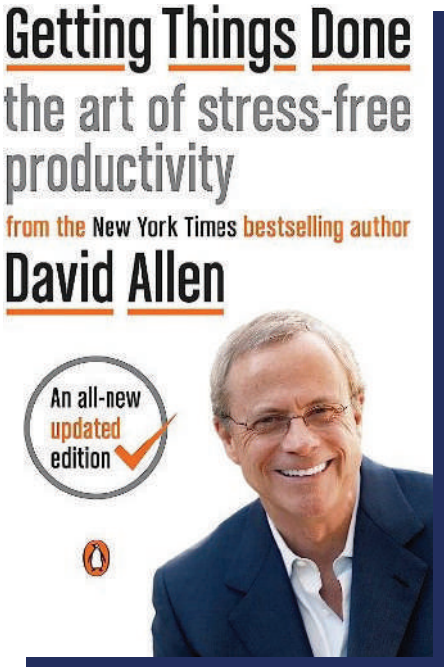
GSMR at the Global Water, Energy and Climate change congress 2023 held in the Kingdom of Bahrain

BOOK Review

GETTING THINGS DONE: THE ART OF STRESS-FREE PRODUCTIVITY"
by David Allen

A review by:
Shayma Ashkanani
Eng. Maintenance Planning
KIPIC

Available on Amazon.com



"Getting Things Done" by David Allen is a game-changing guide that transforms the approach toward organization and productivity. In a world overflowing with tasks and responsibilities, Allen's methodology offers a practical and effective system to tackle it head-on, leading you to a stress-free and more productive life.

The GTD Methodology: A Breakdown

Capture: The first step involves capturing all tasks, ideas, and commitments that come to your mind. These include things from work-related projects to personal errands and creative thoughts. The key is to get everything out of your head and into a trusted system, whether that's a physical notebook, digital tool, or a combination of both.

Clarify: Once you've captured your tasks, it's time to clarify them, meaning breaking down tasks into specific actionable items. For example, instead of having a vague talk like "Plan vacation," you would break it down into smaller tasks like "Research destinations," "Book flights," and "Create an itinerary."

Organize: With clarified tasks, you will organize them into distinct categories or contexts based on location, tools needed, and energy level. This step helps you determine the tasks that can be achieved, based on your current situation. For instance, tasks that require a computer will be joint, so you can efficiently complete them whenever you are at your desk.

Reflect: Regularly reviewing your tasks and commitments is essential for staying on track. Set aside time to review your lists, assess priorities, and make adjustments. The reflection process provides an opportunity to make informed decisions regarding the upcoming task and doesn't allow them to fall through the cracks.

Engage: The final step is to engage with your tasks and take action. You'll work on tasks based on their context, and priority with the available time and resources. The beauty of this book is that you don't waste cognitive energy trying to remember everything; you trust your organized system to guide you on what to do.

The Getting Things Done (GTD) methodology offers extensive benefits that can significantly transform how individuals manage their tasks and commitments. One of its primary advantages is the ability to free the mind from the hurdle of remembering every assignment, idea, or obligation. By capturing these items in an external system, individuals experience reduced mental clutter, enabling them to focus more intently on their current tasks. This

streamlined approach to organizations also leads to increased productivity, as the tasks are broken down into actionable steps that are more manageable and achievable.

GTD empowers effective prioritization by categorizing tasks based on contexts and priorities, guiding individuals toward making informed decisions about what to tackle next. As a result, unnecessary stress and anxiety are minimized, and a greater sense of control over one's workload is achieved. The methodology's flexibility and adaptability further enhance its benefits, allowing individuals to tailor the system to their preferences and work styles. Ultimately, the GTD methodology serves as a compass for productivity and organization, enabling individuals to navigate the complexities of modern life with greater efficiency and peace of mind.

What sets "Getting Things Done" apart is its adaptability: The approach is customized to fit individual preferences and work styles. Whether you prefer digital tools, physical notebooks, or a blend of both, the principles remain effective. The book acknowledges that one size does not fit all and encourages readers to adapt the methodology to their unique needs.

In conclusion, "Getting Things Done" is a transformative guide for anyone seeking to enhance their organization and productivity. David Allen's methodology empowers individuals to take control of their tasks, alleviate mental clutter, and achieve a sense of accomplishment. Whether you're a busy professional, a student juggling multiple responsibilities, or simply looking to bring alignment to your life, this book offers a roadmap to stress-free productivity that can lead to lasting positive changes.

Benefits

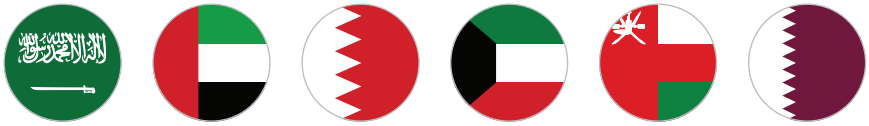
OF JOINING GSMR

الجمعيـة الخليجية للـصيانة والأعتمـادية
Gulf Society For Maintenance & Reliability

WHAT'S IN IT FOR YOU ?

GSMR is the leading non-profit organization for maintenance, reliability and asset management professionals in the Arabian Gulf.

- Training & Certification Programs are offered virtually and physically at an optimal cost
- Extensive support to obtain internationally recognized certifications such as CAMA & MARC
- Special exam fee for GSMR members
  - o CAMA Exam Fee - $300
  - o MARC Exam Fee - $275
- Free log-in to Executive Insight & Technical webinars hosting the industry's best MR&AM professionals across the GCC and the globe (*Certificates given only for GSMR Members)
- Opportunity to publish technical articles and papers through **"OSOOL"**- GSMR's quarterly e-magazine
- Extensive exposure across GSMR social media channels through popular campaigns such as GSMR Member Speak
- Facilitate a webinar with MR&AM leaders from around the world.
- Gain visibility by presenting a technical webinar on industry relevant topics
- Easy access to and networking opportunities with regional and global MR&AM leaders



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