

# ADNOC REFINING CONTINUED REFINEMENT





ADNOC Refining, the refinery arm of ADNOC (Abu Dhabi National Oil Company) take the crude oil produced by the rest of the Group and turn it into gasoline, jet fuel, LPG and other usable petroleum products. Last year we had a fascinating conversation with them about a bold project to run the various refinery specific applications used by the company in synchronisation with each other, giving the business a holistic view of their entire operation.

Since we last spoke to ADNOC Refining has continued to build on the project, overcoming some hurdles along the way. When we're reunited with Fuad Al-Ansari, the Vice President of Information Technology for ADNOC Refining, he is keen to tell us about their progress.

"I would say that since last year we have become more complex in our operations," Al-Ansari says. "We've seen such a rapid expansion in our refineries which inherently has increased the level

and from an IT perspective we need to address those challenges in order to enable our business with a competitive edge," he says.

To address its challenges ADNOC Refining has developed an agile digital platform that can cope with that level of complexity and address the rapid expansion of the operation while providing robust and scalable solutions.

"To address the criticality and sensitivity of the infrastructure from an IT perspective we have to create a safe and secure environment, addressing the risks associated with the convergence of IT and OT (operation technology)," Al-Ansari says.

This is the challenge IRIS or the Integrated Refinery Information System, was designed to overcome, and since we last talked with Al-Ansari the project has come a long way.

"The IRIS project is comprised of 17 refinery specific applications that are integrated horizontally and extract operational data from the OSI-PI historian database and turn it into contextual information so to provide us with total visibility of the operation and give our management the basic tools for a faster and more calculated decision-making process," Al-Ansari says. "It gives us a benchmark for the actual

**"IN SUCH A COMPLEX AND VAST ENVIRONMENT THE INFRASTRUCTURE HAS BECOME MORE CRITICAL THAN EVER"**

of importance of our assets. Also, we've engaged in a new joint venture with our international partners; ENI and OMV."

The complexity of the project brings its own challenges as Al-Ansari explains.

"In such a complex and vast environment the infrastructure has become more critical than ever. These are the challenges our company is facing in general

WE FOLLOW UP WITH ADNOC TO FIND OUT ABOUT THEIR CONTINUED PROCESS OF TRANSFORMATION

# CONTINUED REFINEMENT

PROJECT MANAGED BY: TREVOR GRETSINGER

Fuad Al-Ansari, the Vice President of Information Technology for ADNOC Refining



# Fully-Optimized Asset Performance Management

PCMS is the industry's leading Asset Performance Management software. Being jointly implemented by MISTRAS Group and K-Soft at ADNOC plants, PCMS stores, organizes, and analyzes all of a company's mechanical integrity data, while linking data across phones, tablets, and computers.



**Transform Your Asset Performance Management Today.**

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PCMS: YOUR HUB FOR ASSET PERFORMANCE MANAGEMENT

Managing inspection and mechanical integrity (MI) data across thousands of individual components can be difficult for one plant, let alone across multiple facilities. The task becomes even more daunting with manual, paper-based data management. Without an immediate way to access the condition of your key assets, they become more susceptible to damages and potential failure.

To streamline the data management process, MISTRAS Group (NYSE: MG) – a leading, global, OneSource provider of asset protection solutions – offers its Plant Condition Management Software (PCMS). PCMS is the process industry’s leading Asset Performance Management application (APM) for managing inspection and maintenance data on piping, pressure vessels, safety relief devices, valves, tanks, rotating equipment, and more.

Backed by decades of experience in asset, corrosion, and inspection data management, the APM software stores, organizes, and analyzes inspection and MI data for all of an organization’s assets and facilities. Working in partnership with trusted implementation partner K-Soft, MISTRAS has implemented PCMS at ADNOC Refining’s two new plants, RRW and CBDC.

CENTRALIZED DATA ACCESS

PCMS serves as the upstream, midstream, and downstream industry’s APM software of choice because its various modules create a web of interconnected compatibility, eliminating the need to manage multiple applications to perform total asset integrity analysis. With a single application, users can perform:

- Asset and Inspection Tracking & Analysis
- Inspection and Turnaround Planning
- Corporate & Site-Level Business Analytics
- Integrated Risk-Based Inspection (RBI)
- Corrosion Analysis and Trending
- Reliability Centered Maintenance (RCM)

The software optimizes long-term maintenance planning strategies by enabling operators to identify problems before critical failures occur, limiting repair costs and reducing unplanned shutdowns.

As PCMS’s foundation, the corrosion management module tracks wall thickness, corrosion rates, upcoming inspection dates, and retirement dates on any asset. 20 different test case scenarios are administered to thickness data to determine critical dates for each condition monitoring location (CML) and corrosion circuit.

RISK-BASED INSPECTION (RBI)

PCMS offers an evergreen approach to RBI management with the choice of quantitative, semi-quantitative, or qualitative approaches within the platform. PCMS’ embedded RBI calculators enables users to risk rank equipment, prioritize inspection and maintenance tasks, identify potential damage mechanisms, and recommend the appropriate inspection procedures.

PCMS is the only APM product on the market that fully adheres to the latest API 581 standards. Working in conjunction with Equity Engineering, MISTRAS offers a single source database approach to a full risk analysis. Users have the ability to select varying RBI methodologies from fully quantitative, semi-quantitative, and qualitative per equipment. This approach allows RBI personnel to select the methodology that fits the equipment need.

Semi-quantitative and Quantitative RBI calculators leverage existing data maintained in the traditional IDMS platform and incorporates additional operational conditions to make the path to a Risk Based methodology in the software a simple and cost effective approach.

Full integration with API 571 models provides the users automated damage screening and guidance on what damages the plant is facing, risk ranking of the damages, and autogenerated inspection plans based on industry codes and standards.

Our RBI integration teams work closely with customers throughout the world to implement these RBI methodologies with plant personnel, transferring knowledge to the owner-users to run and maintain a sustainable RBI process.

RELIABILITY-CENTERED MAINTENANCE (RCM)

PCMS is helping to transform the asset integrity industry. Rather than waiting for failure to occur and then fixing the problem, PCMS allows facility operators to proactively stay on top of asset maintenance and integrity with a module emphasizing reliability-centered maintenance (RCM) of rotating equipment.

A full library of rotating equipment failures can be embedded into PCMS, making the RCM process easier. The library contains over 700 equipment types, 49,000 failure mechanisms, and over 4,000 predictive maintenance (PdM) tasks.

After equipment and components are loaded into PCMS, the software automatically generates an inspection schedule based off RCM methodology and matching entries. This keeps facility operators informed about when maintenance is necessary, consequences of failure, and recommended actions to mitigate risks.

MOBILE DEPLOYMENT

Satisfying the needs of a changing world, PCMS’s mobile deployment capabilities ensure accurate, timely, and omnipresent information with a touch of a screen.

Mobile inspection capabilities optimize efficiency and maximize data accuracy. It allows for immediate notifications of identified safety issues, standardized reporting to foster company-wide consistency, and inspection results for well-informed decisions. Key performance indicator (KPI) dashboards provide real-time analytics and eliminate the need for manual data entry, saving time and resources.

Reciprocal data-sharing across platforms streamlines communications to and from technicians and operators. As an inspection need becomes apparent, PCMS operators send a file to technicians’ devices, alerting them of the equipment’s location and type of inspection required. Technicians complete the inspection and relay real-time data and images directly back to PCMS, using pre-populated question and answer forms which guarantee consistent reporting between inspectors.

ENTERPRISE DATA MANAGEMENT

PCMS doesn’t just centralize inspection and MI data for a single plant; it can also serve as the data hub for all of an organization’s facilities. With PCMS Business Intelligence (BI), all of a corporation’s PCMS databases, from a single site to a corporate-wide deployment, report back to an integrated dashboard, placing advanced, comprehensive, user-friendly data in the hands of a variety of users from unit inspectors to corporate executives. The program’s multi-platform design is compatible with any desktop, mobile, or tablet device, and each platform is equipped with full BI functionality.

The BI tool transforms all disparate raw data into interconnected, smart, interactive data illustrations. Users can easily cross-reference data across years or concurrently amongst facilities and seeing the total data operations right next to each other allows the opportunity to create connections that were previously overlooked.

ONESOURCE FOR INSPECTION DATA MANAGEMENT

All refinery and plant operators have a need for accurate, timely, easily-accessible data. MISTRAS’ PCMS platform optimizes the inspection data management process by placing this data at the fingertips of all stakeholders, from technicians to corporate executives. With modules for data storage, risk based inspection, reliability-centered maintenance, data reporting, and more, PCMS optimizes the inspection data management process into a single platform.

For more information, visit [www.pcmssoftware.com](http://www.pcmssoftware.com) call +1 (216) 674-062 (USA) or for Middle East - contact K-SOFT FZ LLC - [www.ksoft.ae](http://www.ksoft.ae) call +971 4 3913523 | +971 4 391 3147 (UAE)



performance of our facilities, as well as timely response times to changes in the marketplace.”

DIGITAL TRANSFORMATION JOURNEY

For ADNOC Refining it has been a journey of Digital Transformation in the past few years.

“We are utilizing a set of innovative tools from the Honeywell suite of applications to address various aspects of our business. Applications such as Operator Logbook allow operators to transfer from traditional log entries and logging of activities, into a collaborative digital platform where everything is predefined and preconfigured in a very high-tech environment so they can be

analysed and reviewed by other peers instantly. The conversation now shifts from what happened to what can be done. We are moving towards a more pro-active mode of operation”

Another component of IRIS offers the business a state-of-the-art asset integrity solution.

“It is a Honeywell product we’re using called Asset Sentinel,” Al-Ansari says. “It gives us visibility of more than 800 critical assets across the operation. At any point in time, we can monitor and gauge their efficiency, and if they operate outside of their operating window it’ll be highlighted instantly. Again, this is an example of how the philosophy around maintenance is moving towards



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condition-based than schedule and time-based.”

This is just one of the features IRIS has which coalesce large amounts of data, making them easy to interpret so that engineers can make essential decisions.

“We’ve developed more than 3,700 Key Performance Indicators which are being extracted from across the operation and are being displayed in a user-friendly dashboard that is accessible to every layer of the organisation,” Al-Ansari points out. “These are just a few of the major applications that make up the IRIS. We have got a Production Accounting and Scheduling system in place that reconciles the whole operational values. It used to take us weeks to take our operational mass

balance, but nowadays we can do it in less than a day. It’s a one-of-a-kind set up in the refining business.”

#### A CONSTANTLY UPDATING VISION

These tools are essential for ADNOC because the oil and gas sector is one where it’s critical to remain constantly aware of the data.

As Al-Ansari says, “For the refinery business it’s important to track your Refining Margin continuously. If you’re selling a barrel of crude for X amount of dollars and after refining it and producing other refined products you gain Y amount of dollars, then the difference between those numbers is your refining margin, after discounting the operating costs and all the costs associated with production. Given the data availability of IRIS, we have a practical solution that allows us to do this calculation quickly and precisely. All the processes are going digital and we don’t have >>

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IT’S IMPORTANT TO TRACK  
YOUR REFINING MARGIN  
CONTINUOUSLY”



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### OWL CYBER DEFENSE

#### HARDWARE-ENFORCED CYBERSECURITY, A STAPLE IN THE RACE TO PROTECT THE DIGITAL TRANSFORMATION

Organizations in the Middle East are quickly realizing that the hype around the Fourth Industrial Revolution (Industry 4.0) and the Internet of Things (IIoT) are more than just buzzwords. Industry 4.0 is at the forefront of operational strategies for the world's largest companies. With 44% of organizations already reporting advances towards digital transformation, there is significant momentum behind the race towards full process automation.

At the same time there is a parallel race to protect these digital environments. Leading companies recognize that along with a wider digital ecosystem, comes potential vulnerabilities against the networks they operate on. Those companies leading the race are working diligently to mitigate those risks with hardware-enforced cybersecurity. A great example is the Abu Dhabi National Oil Company (ADNOC). They've introduced a new strategy titled, "ADNOC 2030". While there is a strong focus on technology, people and partners to maximize the value of operations and optimize performance, a crucial initiative of ADNOC 2030 is to harden defenses with cutting-edge cybersecurity solutions that ensure all critical digital assets are protected from external penetration and malware insertion.

A key requirement for optimization of oil producing operations is secure and readily available operational data that can be used to manage operations, perform remote monitoring and provide support. The most secure communication links for data transfers are hardware-enforced security solutions such as data diodes. Data diodes deny the possibility of network probing for vulnerabilities, a prelude to cyber-attacks. When a one-way data transfer security policy is rendered in hardware, it is physically impossible to attack the plant through the communication link. Or a quote here about the benefits of using data diodes

The physics of one-way hardware links absolutely defeat all traditional hacking methods (malware, ransomware, zero-day exploits) which all rely on software weaknesses, weaknesses that don't exist in hardware solutions. This type of

technology, while new to some people, is used widely by esteemed critical infrastructure owners, operators and government agencies globally for isolating and protecting high-security networks.

To meet the high demands of securing Industry 4.0, Owl Cyber Defense, the original patent holder and developer of data diode technology, is again leading the market with both high-bandwidth solutions for communicating with the cloud and low bandwidth end-point protection devices perfect for the IIoT and IIoT. Critical infrastructure operators need high-bandwidth edge security to transfer data emanating from the plant, as multiple data flows with multiple data types (files, SIEM, syslog, historian data, etc.) across the OT network boundary. This data can then be securely transferred to the cloud for any number of remote applications.

End-point protection and micro-segmentation, key to protecting assets within a plant, were traditionally protected by industrial firewalls. But firewalls are software based and prone to all of the typical vulnerabilities that are used to hack companies every day (misconfiguration, lapse in updates, default passwords, zero-day exploits, ransomware, malware, etc.). However, the latest innovation in data diodes is facilitating the wholesale replacement of firewalls with better security, lower price-points, fast deployment and significantly reduced long-term support and maintenance costs.

As has always been true, the main tenant of cybersecurity is simplicity. The more complex a solution, the more likelihood mistakes will be made, holes will be left, and it will be impossible to keep current with updates. Data diodes provide the opportunity to introduce a much more secure solution, a simpler to maintain solution, and technology that has been proven on the front lines of the cybersecurity battlefield for the last 20 years.

Find out more and visit us at: [www.owlciberdefense.com](http://www.owlciberdefense.com)



to rely on manual calculations anymore. What used to take us weeks now takes less than a day to complete.”

“The new JV with Eni and OMV encourages us to be more creative in stretching the dollar value out of each barrel of crude that we process,” he continues. “Our end-to-end Supply Chain Management needs to access and analyse the production values in a much more complex and faster pace where a sophisticated system such as IRIS will play a pivotal role in their decision-making process.”

IRIS has already proved a success story for ADNOC Refining in terms of Digital Transformation, but Al-Ansari believes it's more than that. He argues that it's nothing less than a vision of the Smart Refineries.

“We believe that with the foundation that we have put in place as IRIS, we've paved the way in creating the future Paradigm of Digital Twin for our Operation,” he says. “That means with IRIS we'll have a single source of truth, we have a business advisory tool, and we have total visibility across the whole operation. Utilizing the Digital Twin we would be capable of tuning our plant closer to optimum conditions.

“Our ultimate goal is to create an agile software framework that is able to use real-time data to provide visual intelligence and actionable recommendations to help us optimize production and increase profitability. That's our vision of Refineries of the Future.”

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