Refining & Petrochemicals

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THE RIGHT APPROACH

In today's highly competitive landscape,companies should be using every piece of technology on the market to optimise their performance. But is this enough to ensure continued and long-term success?

In a 2011 report entitled 'Operations Risk Management', a group of chief financial officers from a number of industries identified as their top priority the need to maximise return on assets, followed closely by reducing asset life cycle costs and improving the reliability of those assets. The results of this survey couldn't be more relevant today as companies are increasingly having to operate in an ever competitive and volatile market.

"Chemical companies must adapt to both regional and global competition through the downstream value chain," believes Ossama Tawfick, vice president of sales for the Middle East and North Africa (MENA) region at ApenTech.

"This requires operational efficiencies, such as reducing energy and driving maximum throughput of plant assets as well as streamlined processes and appropriate skills to get the most value from the operation and meet customer demand."

According to Tawfick, those businesses which adopt a model-based approach to

IN NUMBERS

95%

Almost all c-level executives expect digital innovation at their firms to flourish over the next three years.

Ossama Tawfick is VP of sales at ApenTech in MENA.

Chemical producers can reap significant benefits by adopting a model-based approach to manufacturing.

"Investment in optimisation software can increase reliability, reduce costs and create greater operational efficiencies in production and supply chain management."

manufacturing have the flexibility to address operational issues and achieve the most immediate benefits.

"With powerful tools, companies can minimise costly downtime, improve quality, increase throughput and optimise product yields. The bulk chemicals industry is energy-intensive, producing products in high volumes and at low margins."

As Tawfick points out, approximately 60% of energy in the bulk chemical industry is utilised for feedstocks or raw materials in the manufacturing process of chemicals. These bulk chemical are then used to produce higher value products, such as plastic containers or fertilizers. As global demand for these products continues to grow, so does the need for intermediates.

"According to the Energy Information Administration (EIA), the value of bulk chemicals shipments is expected to grow to $429bn in 2025. As such, the global chemicals industry has witnessed rapid growth over the past decade, particularly in emerging countries like China. Many industry experts predict that at least half of the top ten chemical companies in the next ten years will come from China and the Middle East," Tawfick said.

If this is to materialise, companies will need to prepare themselves for a wave of rapid-paced growth, that will not only require them to work faster, better and smarter, but do so in the most cost efficient and optimal way.

"There is a strong recognition amongst industry leaders that technology can help significantly in driving the overall operational effectiveness of plants," Tawfick said.

"For example, PwC recently completed its Breakthrough Innovation and Growth survey of nearly 1,800 C-suite executive-level respondents, including some 50 chemicals industry participants from 12 countries. Of those, an impressive 95% said they foresaw digital technology innovation at their company over the next three years and 50% expected breakthrough or radical advances."

And while many preach caution against the disruptive forces of technology, Tawfick is quick to point out its numerous benefits.

"Investment in optimisation software can increase reliability, reduce costs and create greater operational efficiencies in production and supply chain management," he said.

But technologies are only as successful as the people using or applying them. Advanced integrated software systems are designed to empower staff to optimise operations and take advantage of market opportunities.

One way to ensure that technology serves people and not the other way around is by implementing a model-based approach. In this tested method, technology not only bridges the gap between engineers' knowledge and action, it also acts as a platform for data-sharing and better decision making within different parts of the organisation.

"Being able to visualise plant d=ata and predict values of process variables is essential when it comes to developing a model-based culture," says Tawfick.

IN NUMBERS

50%

Half of c-level executives expect radical advances over the next 3 years.

60%

The amount of energy utilised for producing bulk chemicals feedstock.

"Viewing contextual data alongside process data to show what is happening in production delivers greater insights into the source of problems. The process model drives value in plant operations and by being detailed enough can robustly predict real plant behaviour over an expected range of conditions linked to process data. The data itself is conditioned to smooth out measurement errors with an execution environment to run the model whether on-demand, scheduled or event-driven."

By using integrated software tools, the process engineer can build a model of the plant unit and validate it against plant data from the production engineer and the plant data historian.

The model is then used to identify alternate operating conditions, while the chemical production engineer can use the model to identify alternate operating conditions.

"The next step is to reconcile the model as the model runs online," explains Tawfick.

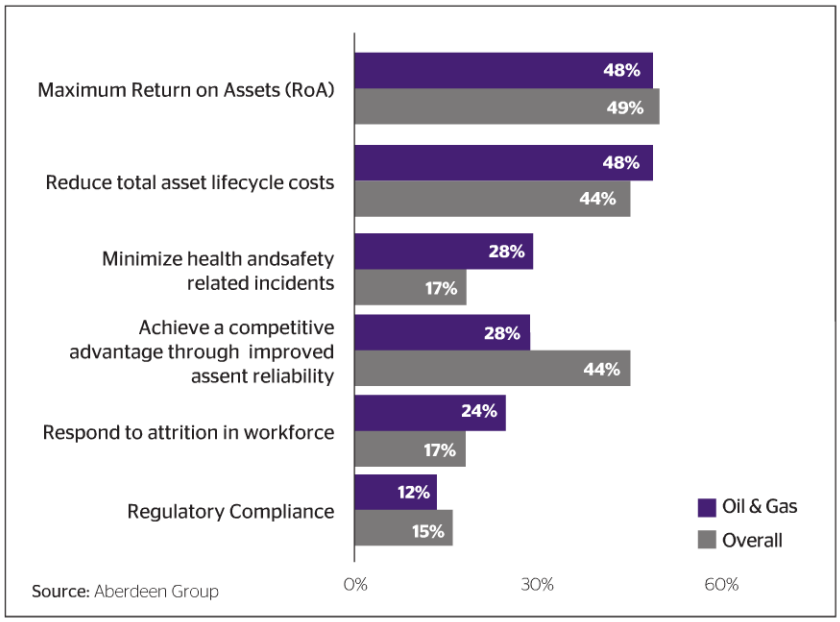
"Data is then saved in the data historian, so the production engineer can see immediately how the model changes over time. After using Real-Time Optimisation (RTO) to deploy the model 24/7, the model calibrates itself daily and provides optimised set points to the process control system.

"The plant is then able to reach and maintain capacities higher than ever previously seen and frees up significant time for the unit engineer."

As an expert in the field, Tawfick has seen first-hand that adopting a model-based approach to manufacturing using cutting-edge technology, gives businesses the flexibility to address operational issues and achieve the most immediate benefits.

"With powerful tools, companies can minimise costly downtime, improve quality, increase throughput and optimise product yields," he says.

As data-driven technologies continue to



A common challenge for refiners and petrochemical producers is improving the analysis process.

advance, and arguably at a pace faster than ever, they tend to generate an overwhelming amount of data, raising the need for time and cost-efficient analytics tools.

"Making sense of vast volumes of production data is the essence of asset optimisation. If you cannot see what you do not know, then you will not be able to make the right decisions to optimise production and be competitive. The inside story of operational intelligence lies in rich thin visualisation and analytics capabilities that improve production execution, enabling process manufacturers to quickly identify and resolve operational issues," explains Tawfick.

"The challenge for many refineries and chemicals companies in today's market is to improve the analysis process and incorporate product characteristics and other non-time series data along with the usual sensor and meter data being collected by the process historian. It is those data elements that provide additional context for an improved understanding of conditions that limit production operations," he adds.

Incorporating product characteristics with the usual sensor and meter data can bring significant benefits.

Tawfick compares modern manufacturing to an ecosystem of interconnected software and hardware that help companies optimise their plants. To maintain the balance, however, operators need efficient decision support tools that not only help them make sense of vital information but also ensure operations can adapt quickly to dynamic conditions, he explains.

"The latest visualisation and analysis tools help users to understand the story behind the data, converting production and business data into operational intelligence with the ability to access, visualise, analyse and monitor data in a clear, graphical display all in one single platform. Visual graphics help engineering users to understand the patterns in the data and associate them with conditions in the plant. This means that users can quickly identify issues and correct problems in production."

"The common theme here is to free the refiner from worrying about non-core performance issues, but to have those facilities well managed."

But you can implement all the right technology and still face challenges. They say a pile of bricks is not a house.

To be truly successful, companies need to adopt a holistic, cradle to grave approach that takes into account not just their technology and assets, but also the people working on plants.

After all, technologies are only as successful as the people using or applying it.

"The common theme here is to free the refiner from worrying about non-core performance issues, but to have those facilities well managed," says W. H. Bosler of US-based Texas Consultants.

"This degree of availability of data and information about a plant will result in a significant change in the political power structure within the organisation."

In response to this, says Bosler, companies should introduce a reward system for each employee. The idea being that an appropriate behaviour within the new information structure will lead to increased rewards for the participant and thus ensure better efficiency and productivity within the organisation.

"The resulting nimble refiner or petrochemical plant is likely to be the lowest-cost and highest-quality leader in the market. Being nimble is a result of users adapting the system to their current needs upon demand," Bosler adds.

He also suggests asking for employees' feedback and taking it into consideration when contemplating changes within the organisation. Japanese car manufacturer Toyota, which is famous for its extremely successful business model and unrivalled operational efficiency, implements 19 suggestions per employee per year, and believes that this yields significant competitive advantage to the company.

Bosler concluded: "Configurable, adaptable, integratable, off-the-shelf software products can provide a way for refinery and petrochemical plant personnel to adapt to an ever changing environment. The challenge is to do it in such a way that the personnel using the systems do the changing, adapting and integrating on a daily basis and are rewarded for so doing. That way, the business is substantially increasing the probability that it will survive and prosper." RPME