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# Hydrogen In Oil Refineries: Understanding The Importance Of Hydrogen Monitoring and Best Practices

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A recent Reuters headline reads, "U.S. oil refining capacity down in 2021 for second year." The article notes that recent government data shows that "plant shutdowns keep whittling away on their ability to produce gasoline and diesel." While refining capacity is down, fuel demand is up, thanks in part to the global recovery from the Covid-19 pandemic. Together, these factors can lead to higher prices at the pump and contribute to the inflation now plaguing our economy.

And this increase in demand is further complicated by the fact that we haven't built a new oil refinery with significant downstream unit capacity in the U.S. since 1977—45 years ago. Although, it's important to note that several smaller refineries have come online in recent years. And capacity has also been added to existing refineries through upgrades or new construction.

With that said, it's important to get the most out of existing refinery capacity, and one way to do that is by improving refinery maintenance and productivity through real-time hydrogen monitoring. I'm the founder of a company that provides hydrogen monitoring solutions, so I've seen the difference this can make.

In my previous Forbes article, I addressed the many derisking and asset-enhancing benefits of real-time monitoring of hydrogen in its many applications, including at oil refineries. Now I'll expand on the role of hydrogen and some best practices companies can follow when it comes to hydrogen monitoring.

## The Role Of Hydrogen In Refineries

Let's look at hydrogen's ability to ensure continued, efficient, uninterrupted operations of existing oil refineries. Hydrogen plays several key roles in a refinery. It is both used as a "catalyst" (to stimulate chemical reactions) and as a process byproduct that (in certain concentrations) can be an indicator that some critical action must be taken.

Constant monitoring of the existence of hydrogen in various concentrations (e.g., in a process stream) can indicate serious problems that need to be addressed immediately. Thus, such monitoring can save money for refineries and avoid costly disruptions that can impact the price of gas at the pump and the plant's overall profitability. Fewer disruptions could mean improved refinery efficiency, which could also help alleviate

the U.S.'s limited refinery capacity, which continues to be strained by higher demand and, as previously mentioned, the lack of new refineries coming online to meet that demand.

Real-time hydrogen monitoring also provides the ability to collect data over time that can predict trends, indicate equipment health and support planning needed for just-in-time maintenance. And it can even aid in long-lead-time asset acquisition planning (which is often measured in years).

At a typical oil refinery, I've found there can be up to two dozen physical locations where real-time measurements of hydrogen are hypercritical. Knowing the precise concentration of hydrogen present at key points throughout the refinery provides a heads-up to plant operators that are crucial for both optimizing operations and avoiding interruptions.

There are many cost-saving benefits to such monitoring: refinery uptime and output, overall safety, product quality, process productivity, catalyst (stimulus) health, recycle contamination, solid fuel conversion (called "coking") and flare (BTU) monitoring. Plus, better control of recycling streams provides increased availability of net and recycle of hydrogen, often removing the need to purchase tanks of expensive hydrogen from third-party providers.

Now, this list may not make much sense to the non-energy-sector reader, but it is a big deal in the world of oil refineries. The bottom line here is that having this real-time information available allows operators to make timely and precise adjustments that optimize the usage of hydrogen as a catalyst and as a red flag that something needs their immediate attention.

## Best Practices For Hydrogen Monitoring

A key point here is to know that there have been massive advances in refinery monitoring capabilities in recent years and the opportunities are many for dramatic improvements. (Disclosure: My company provides hydrogen monitoring solutions.) Be sure to fully investigate your options and make sure that you define real-time monitoring as immediate, continuous, 24/7 and that monitoring includes all the following abilities:

1. Detect/sense.
2. Measure.
3. Record.
4. Analyze.
5. React immediately.

Also, understand that hydrogen monitoring is more than a tech "device" or "sensor." It's become a full solution with the ability to embed monitoring systems inside of stand-alone installations or OEM integration into existing analyzers, both new and retros to existing equipment. So prepare for many "monitor inside" opportunities.

To avoid expensive maintenance, it's also important for leaders to be aware of autocalibration technology that allows monitoring systems to be operational in the field for many years, sometimes a decade or more, which minimizes and often eliminates the need for adjustments. Avoid those that require consumables that add to the costs of maintenance and related labor costs. These are not razors that need a new blade every few years.

## Bottom Line

It's very important to monitor operations for safety and process optimization to maximize cost savings. Anything that could disrupt production is a problem and adds to the challenges as U.S. refinery utilization reaches "as high as 95% on a monthly average basis this summer in response to high product prices and crack spreads for gasoline, distillate fuel oil, and jet fuel."

Plus, older monitoring technologies are giving way to major safety and effectiveness improvements, operating in real-time, 24/7. For example, new technologies now support continuous hydrogen monitoring using explosion-proof, solid-state, self-calibrating, non-consumable, automatable and miniaturized systems that can be embeddable within hydrogen-related equipment.

There is a learning curve to all this new technology, but when packaged as solutions, much of that sophistication is hidden in a way that makes it much easier to quickly implement and utilize. But, such solutions still must include effective product training that is visual, engaging and interactive where possible. Look for creative concepts such as demo videos, case studies (we all love stories), troubleshooting cheat sheets and, of course, a help desk to call when needed.

These advancements can be key to the entire future viability of the broader "hydrogen economy" and as part of our country's long-term clean energy goals. Follow me on LinkedIn. Check out my website.

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