

Flaring Fosters Safety



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FLARES IN a refinery or chemical process plant are first and foremost a safety device. Many countries require monitoring of the flare to ensure pollution regulation standards are not exceeded.

In the U.S., the EPA passed the Maximum Achievable Control Technology Petroleum Refinery Sector Rule (MACT RSR) 63.670, which extends and strengthens the rules governing stationary emission sources in petroleum refineries. These rules apply to all sources regardless of age.

In addition to environmental stewardship, a flare-metering device can help plants operate with greater efficiency, leading to cost savings, even in the absence of regulation.

To learn more about the finer points of flare metering, Chemical Processing chatted with Panametrics' Dan Johnson, global product manager for flare.IQ. Panametrics, based in Houston, is a Baker Hughes company.

Q: How does flare control drive down operational costs?

A: To properly combust what you're flaring, you need to add fuel to boost your BTU content and steam or air to have proper oxygen balance. The tendency is to over-steam or over-aerate the flare to prevent visible smoking. Many refineries, petrochemical plants or LNG facilities are in the public eye. And the public has generally been trained that white smoke is okay and black smoke is bad — when, in reality, black smoke is just carbon soot and white smoke generally means in a flare application that you are snuffing out the flame or reducing your combustion efficiency. Steam and fuel cost money, they're utility costs for the plant.

Q: What common operational issues can flare flow measuring identify and how?

A: A proper measurement system in a flare can help trace potential leaks. It can help the refinery or petrochemical plant understand what process unit the flaring (excess gas) is coming from — and, thus, to focus on properly tuning those chemical operations to potentially reduce

the overall emission profile of the system. Proper measurement is really critical. It also is crucial in providing the control. There's no direct measurement of combustion efficiency on a flare system — it's inferred based on your measurements of each of the lines going to the flare. So, having proper measurement there can help to drive the proper control or help to reduce operational cost.

Flare is really tricky because it's completely random. You need a measurement device that can measure very, very low flow. If all process units fail at the same time, it's designed to handle all of

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that flow. When in reality 99.99% of its operation, it's going to be very small upsets from one process unit resulting in a very, very small flow through a very large pipe, but you still need to handle and properly dispose of that gas. Having a measurement system that is tuned across that entire dynamic range of the flare is very critical.

Q: What are some of the more difficult aspects of proper flare control and how can they be addressed?

A: Again, the system is fairly random. It operates most of its life at a very low flow condition; when it does change, it changes rapidly. So, having a system that is extremely responsive and can measure and then control that change rapidly is essential. There are inherent lags in every piece of the system. So, accounting for those lags for the control scheme is also very crucial. Being able to cope with the ebbs and flows of flaring is generally really difficult because traditional control systems have very slow response time. And if you look at the way the EPA words these rules, there are latencies built in. But if you're talking about environmental stewardship or plant safety, these lags

are far too long for proper control. The difficulty in flare really comes from the random nature and sporadic nature of these events.

Q: How can you tell if your current flare flow meter isn't installed properly or working correctly?

A: You'll see inefficiencies in combustion. The plant will have a higher emissions profile. This could result in volatile organic compounds being released into the atmosphere that could be harmful to the workers and to the neighboring community. You could see smoking events, which in the U.S., in general, are fineable offenses. A facility could actually have its operational permits revoked if it can't operate the flare properly.

Q: How does flare.IQ help fulfill the compliance?

A: The basis of this EPA standard is smokeless operation and high combustion efficiency. As the flare changes rapidly, you need a system that has a very, very quick response time. And what we've developed is a technology that has a response time that's on the order of one to two seconds, versus some traditional systems that have a response time of five to 15 minutes. We've come up with a traditional continuous control scheme that maintains an operational zone that is both smokeless and high combustion efficiency. That drives a few different things. One, it helps maintain compliance. Number two, it helps reduce the overall operational costs of the plant — it'll use less steam and less fuel. Ultimately, it'll have a lower emissions profile, if it operates in that regime all the time.

Q: What's involved in implementing your technology?

A: Every flare has its own fingerprint — no two are exactly alike. And because of that, every system must be tuned to a specific process. Baker Hughes as a company is known as a service provider. We provide both the hardware-software solution as well as the service associated with that to enable efficient installation and proper commissioning of this device.

Q: How does flare.IQ differ from other alternatives?

FLARE MANAGEMENT



flare.IQ solution offers an advanced flare control platform that reduces methane emissions, ensures high-efficiency flare combustion and reduces steam usage in flare systems.

A: What makes our system a bit different is that it's using information that comes at a rate of one to two seconds versus some other technologies that have refresh rates of 30 seconds to a minute or even as bad as 5 to 15 minutes. A lot can happen during that time. The regulation has been written to allow for these lags but, in our opinion, that's not good enough. We believe this solution provides our customers plant safety, operational efficiency and helps them meet regulation requirements. We've also been able to go to different customers and learn from their application. So, as a vendor, we have the ability to see into all these other customers and applications and learn from each one.

There's a lot at stake — some fines are in the hundreds of millions of dollars for air quality. So, it's a big risk for a site to handle this endeavor alone. Having a partner like Baker Hughes I think for these customers is very valuable. ●

For more information visit Panametrics, Baker Hughes, at industrial.ai/flareiq