



Highlights

- An oil and gas refinery needed an AC UPS system to maximize uptime for critical systems in hazardous locations.
- Xenon Inc. designed and built an integrated AC UPS system, based on Phoenix Contact's 500VA QUINT AC UPS, with local alarms and multiple controls.
- The Class I, Division 2-approved system communicates the UPS monitoring data via WirelessHART, so it meets government mandates for advanced diagnostics

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Jordan Wiens

Customer profile

Xenon Inc. is a full-service engineering, integration, and field service solutions provider for process and environmental analytics, industrial instrumentation and automation, and electrical system. Xenon's clients include oil and gas companies, power generation facilities, and industrial plants. With a full range of custom engineered solutions, Xenon provides clients with turnkey support for difficult applications.

Challenge: Maintaining constant power in a hazardous location

Safety and reliability are paramount in oil and gas facilities, especially when it comes to safety-critical instrumentation systems. Xenon worked with an oil refinery that needed to include reliable AC uninterruptible power supply (UPS) in hazardous locations.

The local governing authority mandated that the refinery meet specific uptime requirements for critical systems, such as hazardous gas monitors, boilers, furnaces, or any other

type of environmental or personal safety equipment. The regulation also required each AC UPS to have advanced diagnostics of monitoring and functionality. (See figure 1.)

Jordan Wiens, P.E., the Managing Partner for Xenon's Instrumentation & Automation Division, said many of these power loads are not very big; for example a PLC or small controller. But given the infrastructure of the refinery, which was built in the 1920s, these critical pieces of power were put on traditional power sources that over time



Figure 1: The AC UPS system, based on the 500 VA QUINT AC UPS.

became subject to outages, trips, or harmonic distortion. “As such, they would sometimes trip and go offline. They might come back pretty quickly, but the disruption could cause an environmental event or potentially create a situation that’s hazardous to personnel.”

As an example, Wiens cited one of the systems that supports a network of 36 hazardous gas monitors around the blending pumps at the refinery. “If the system goes down, the detectors don’t work, and then you have personnel safety risks.”

Another example is a running furnace. He explained, “If there is a drop in power and the furnace shuts off, that means you create an environmental event: you’ll either be putting unburnt fuel into the air, or you will shut down and end up causing a domino effect with other process units. So depending on which process unit that furnace might be attached to, then you could have a significant loss of production.”

The refinery investigated several different options. They could put in a large UPS that would supply multiple units, but those solutions typically cost \$50,000 to \$60,000 a piece, plus the added cost of infrastructure to install them. Wiens said the other option is to “build and design a point UPS system, where you just take the specific critical load and put that on a UPS system. That’s where we were able to come in and help.”

Solution

The solution for the refinery’s challenges came in the form of several Phoenix Contact products integrated into one cohesive system. Wiens stated, “We compared a few of the competing products in the market, and I think the Phoenix Contact price point was right, but the primary driver was the known quality of the Phoenix Contact products coupled with client preference. There’s also the WirelessHART diagnostics piece, so if there was a power failure that the UPS saved, we should know about it, because we would catch that.”

Xenon had built a similar system several years ago using a DC UPS, but this instance required AC power. Using Phoenix Contact products, including a 500VA QUINT AC UPS, Xenon developed an integrated system with local alarms and multiple controls. Using the free downloadable configuration software, the AC UPS can indicate critical information when Phoenix Contact batteries are used such as the type of batteries, the health of the batteries, the state of



Figure 2: The intelligent UPS communicates with the batteries to identify potential problems.

charge of the batteries, and more. Using Phoenix Contact’s 120 Wh lithium-ion batteries, the UPS can provide hours of battery backup time depending on the current draw.

Additionally, Xenon used Phoenix Contact’s intelligent UPS to communicate with the batteries to receive status and condition information to identify potential problems. The use of a lithium-ion batteries was important because of their long lifespan. The overall capacity and degradation curve of the discharge rate were important factors in choosing the Phoenix Contact AC UPS.

The system was completed to be used in Class I, Division 2 hazardous approved areas. Phoenix Contact’s surge suppressors conditioned incoming power to avoid voltage spikes with I/O fuses to protect the input and output AC feed to the UPS module. The system also uses Phoenix Contact’s wireless products in conjunction with the Xenon Multiplexer, which encodes the alarms into a 4-20 mA format, so information can be transmitted using WirelessHART.

“Part of the criticality of system is that it has the WirelessHART infrastructure for some of the applications. This ties in nicely. You don’t have to run Ethernet out there or put in wireless radios – you can just drop a WirelessHART transmitter on there. You can hook it up to the contact output diagnostics from the AC UPS, and then you are able to read the health of the system. So you can get information on the battery health, you can record any trip events, and you can tell if the system is offline in any manner.”



Figure 3: Because the Class CC fuses are Class I, Division 2-approved, Xenon does not have to purge the panel.

The system also uses Phoenix Contact's Class CC fuses. These are sealed fuses that are applicable for a Class I, Division 2 application. Wiens stated, "This allows us to install the entire system in a Class I, Division 2 location without having to purge the panel. So now we don't have to use instrument air or any other means of declassifying the enclosure. We just build it, put it out in the field, and let it go." (See figure 3.)

Results: Easy and reliable

"We've been integrating Phoenix Contact products for the last 12 years," Wiens said. "The profit for the integrator comes from having a reputation for consistently reliable, good-looking, functional products. We use Phoenix Contact, even though the products might be more expensive at times, but we use them because of the reliability and our ability to integrate them.

"We started installing these systems about four or five months ago, and rolled them out slowly, about three or four per month," Wiens stated.

"I think the top benefit is the ease of implementation. There's not a whole lot to it. We were able to put these in the field and deploy them easily and quickly. From an integrator perspective, we integrate hundreds of different systems per year, and these are right in our wheelhouse, which is the benefit of having a tried-and-true solution rather than having to figure out something new."

Jordan said that when his team needed technical support, Phoenix Contact was helpful. "We contacted Phoenix Contact support through our local rep, Dave Eveler. We worked with Dave and tech support to get familiar with the capacity of the UPS system, the different trip breaks, the application questions. I feel like we got pretty good feedback and support from the Phoenix Contact team.

"To me, an attraction to the Phoenix Contact products is the reliability, the industry specifications, and the fact that most of the components that we deal with are already hazardous location-rated (Class I, Division 2). About 98% of the work that we do is in Class I, Division 2-rated locations. We try to keep up to speed on the different products that Phoenix Contact puts out. It's usually a go-to for at least the start of a conversation when it comes to selecting components for a solution."

In addition to improving the power reliability, the system also meets the government mandate to monitor diagnostics. "That's what this system accomplishes, all in that little compact format. It's wall-mounted and rated for hazardous locations. Whether your applications involve pharmaceuticals or wastewater, if you have a highly critical application, but you don't have the power infrastructure available to order a large AC UPS power circuit, this type of system fits that niche," Wiens concluded.