

Buzz about medium voltage

New solution for multi-megawatt electric heating systems

Power distribution is a hot topic in many North American industries, but often for all the wrong reasons.

Tasked with increased demand for high power output, many operators in North American sectors such as power generation, oil and gas, petrochemical and chemical have been challenged by low-voltage solutions and their associated logistical challenges.

And the trade-offs have often been great, manifesting in high installation and infrastructure costs that have some have referred to as "economic suicide."

Recognizing an opportunity, many heating and control technology companies have since been turning to medium-voltage solutions for multi-megawatt electric heating systems that offer industry operators the ability to capture the advantages of electric process heat while minimizing the disadvantages of low-voltage, high-amperage designs.

Pittsburgh-headquartered Chromalox Inc., for example, documented a recent case in which a U.S. refinery in need of a 2.4-megawatt electric hot oil process heating system saved nearly \$225,000 in installation costs alone by using a medium-voltage system. And that's not including the additional \$775,000 saved over a 20-year life cycle when factoring in lower operational, maintenance and replacement costs.

Mark Wheeler, director of global product manager systems and service for Chromalox, explains the demand for medium-voltage solutions (commonly accepted as ranging from 1,000 and 69,000 volts) stems primarily from operators wanting to transmit electricity greater distances.

"The easiest thing to compare it to is if you've ever seen a car battery and the wires coming out," he says. "That's low voltage and high amperage. The wires coming off the battery are really thick and really heavy, which doesn't matter because you're running it a short distance. But obviously if you try to do that on a high-voltage line, it would be economic suicide."

Wheeler notes Chromalox developed its DirectConnect medium-voltage electric heating system because installation costs associated with low-voltage solutions were becoming prohibitive for its clients.

"As you go up in energy, you have that



The petrochemical industry stands the most to benefit from medium-voltage systems, notes one expert. Photo courtesy Morguefile.

thick voltage and that amperage gets really high. To carry all that amperage, you have to go with big, thick wires and big circuitry. So the install costs got really expensive even though the electric heater was the same price.

"What medium voltage allows us to do is, basically, flip flop that equation. So now, if we can utilize that higher voltage, correspondingly the amperage goes down really low. And when you have lower amperage, now, all of a sudden, all of those costs you have for wires and contactors and fusions is cut by 80 to 90 per cent."

Medium-voltage systems also give operators the ability to better control the electric input to a heater—in DirectConnect's case to plus or -1 F.

"Think of it this way: you can control electric with a light switch where it's either on or off. You can also control a light with a dimmer switch. The same principle applies to electric heating," says Wheeler.

"What that allows customers to do is, No. 1, cut out all those installation costs and, No. 2, compared to a fuel-fired system, they don't have a lot of excess overruns or excess capacity. They can dial in the heat to what they want through that dimmer-switch control. So from that standpoint, there really is no trade off."

"With electric heat, one of the big

advantages our customers have always been interested in is that controllability, whether it's low voltage or medium voltage."

Wheeler pinpoints the petrochemical industry as the next great opportunity for medium-voltage systems.

"They utilize a lot of on-site power and have their own generating systems," he says. "Just given the spending going on and the infrastructure and the low costs of natural gas, they stand to benefit the most from medium-voltage technology."

Wheeler adds medium voltage will also continue to be challenged by increasing power demands.

"I see it going higher voltage," he says of medium-voltage systems. "When we say medium voltage here in North America, especially the U.S. and Canada, we're talking usually 4,160 volts as the entry level. But we're currently deploying technology for 6,600 volts in the Asia-Pacific region."

"We're also working on 7,200 volts and up even higher. Because any time we can go with higher voltage, it cuts down the costs of installation by factors. It makes it more of a no-brainer for the customer." 

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