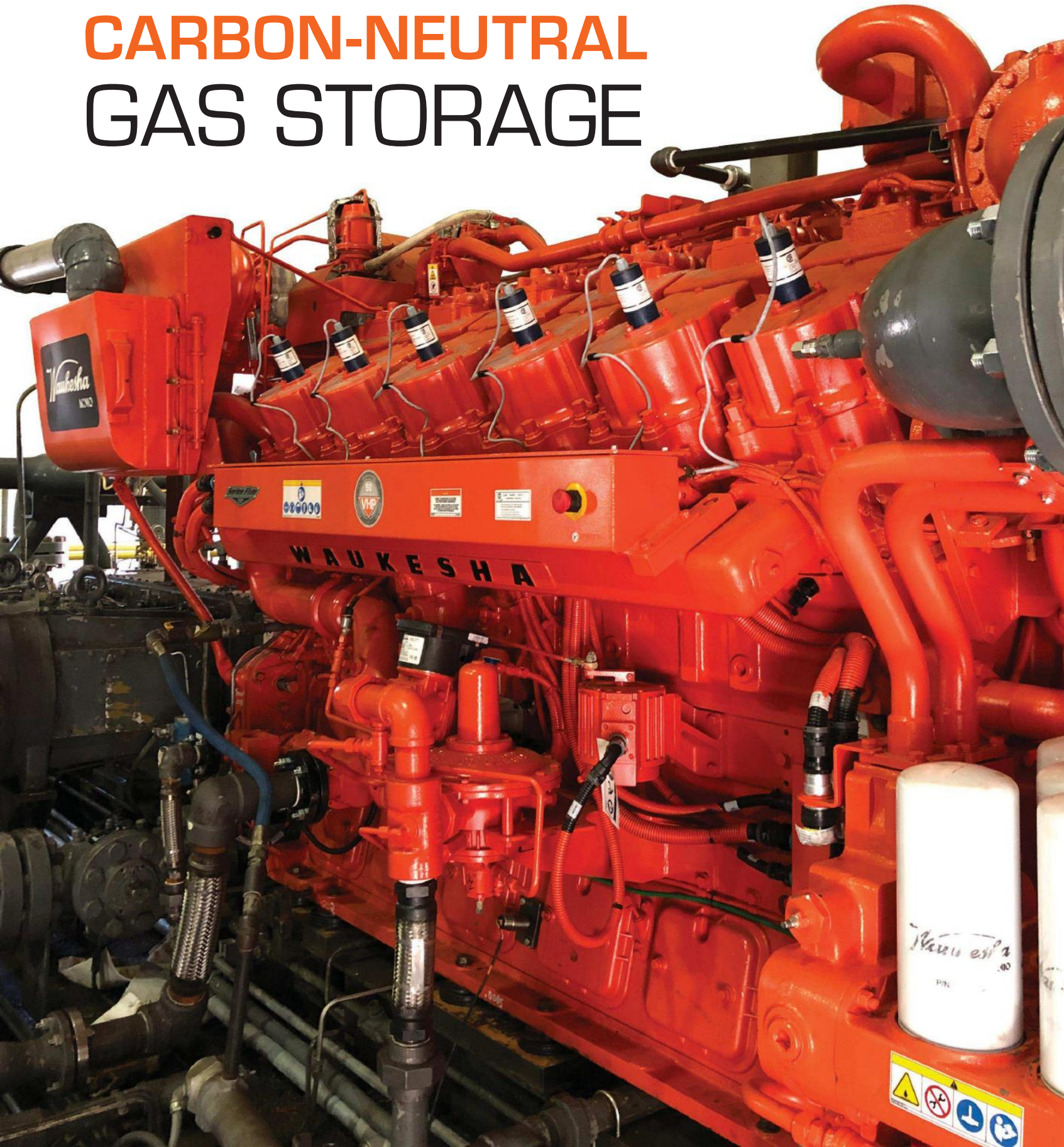


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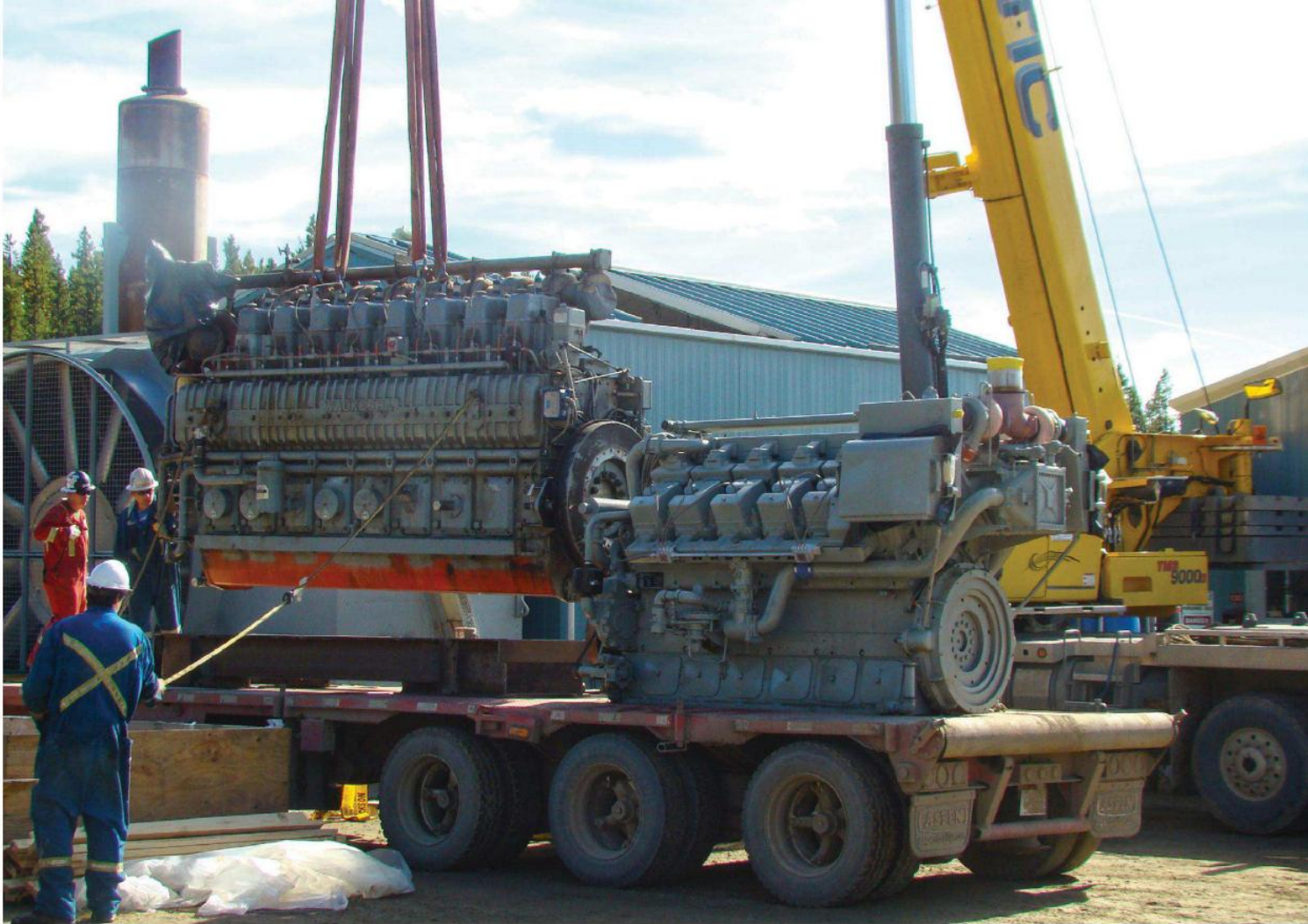
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EMISSIONS CONTROL

VORTEX, ALTRONIC, AND CONTINENTAL CONTROLS CORPORATION CUTS COSTS AND CARBON FOOTPRINTS ON GAS ENGINES ACROSS CANADA

BY DANIEL FOELBER

It happened again — another unforeseen equipment shutdown. Another two to four weeks of downtime will result in maintenance expenses and lost revenue. And who says it isn't going to happen again next month?

Stories like these were common occurrences for customers prior to partnering with Vortex Production Services (Vortex) and Continental Controls Corporation (CCC). Vortex's air-fuel ratio (AFR) business and emissions reductions business are part of its services division, which also provides general service repairs and overhauls. The service division has undergone significant growth over the last few years as Canadian industry expands and customers react to changing emissions regulations.

Four years ago, Vortex was introduced to CCC through a mutual connection. In fact, Vortex's first install was a CCC package. With CCC's help, Vortex got its foot in the door of the AFR emissions reductions indus-

try. Two years after that, Vortex gained the distribution rights to Altronic products, which gave it exclusive access to CCC's products in Canada.

Fast forward to today and CCC, Altronic, and Vortex are quickly disrupting the Canadian market. By installing CCC air-fuel control systems with ultra-low emissions controls and enabling Vortex Emissions Target Solutions (VETS), Vortex has helped oil and gas customers meet and exceed current Canadian environmental NO_x emissions limits, as well as Alberta's methane reduction requirements. "VETS is a cost-effective solution for current and future emissions guidelines," said Ken Osborne, vice president of operations at Vortex. "Our partnerships with Altronic and CCC allow us to upgrade older controls to meet the rigors of new emissions compliance."

Shrinking customers' carbon footprints may allow oil and gas companies to qualify for carbon credits now or in the future. Qualifying for Canadian carbon credits is a big deal



Production Testing Skid With Skirted Vessel At Operator's Control Building

considering the Canadian federal government plans to increase the greenhouse gas (GHG) emissions carbon tax from US\$23 per ton to US\$130 per ton by 2030, which is a compound annual growth rate of 24%. If the plan becomes law, it will severely impact the profitability of the Canadian oil and gas industry. "We are very excited to be promoting these fuel savings and emissions reducing

products with a company like Vortex that can really help bring home these benefits to their customers," said David Fisher, president of CCC. "Now that Canada is raising GHG emissions taxes, it really becomes financially beneficial for all oil and gas companies in Canada to work to lower emissions and potentially even save money."

Continued on page 38

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ECV At Tidelands On A VHP 9390 Engine



The 2019 design of the EGC 6 Electronic Carburetor. In 2006, CCC designed the EGC 2 and the EGC 4, the company's first electronic carburetors. Then in 2017, CCC began development of the EGC 5 and 6.



ECV 5 control valves along with a CCC FM 50 for measuring gas flow. Vortex routinely adds a FM 50 to check fuel consumption prior to adding the complete VETS system, then it provides fuel consumption after the upgrades. They report fuel savings of as much as 20% along with reduced emissions through the integration of the entire VETS system.

THE HEART OF THE VETS SYSTEM

Vortex said it cares more about emissions efficiency and helping the environment than simply doing the bare minimum to meet regulation requirements. "With one customer, we brought their emissions way down, to where they needed to be," said Osborne. "They went from shutting down two to four times a week to timed shutdowns at service intervals." Vortex said it has performed 40 installs for one of its larger customers and has received positive feedback that the units are running well while also meeting or exceeding emissions targets.

By implementing the VETS system, which depends on CCC's components, Vortex was able to eliminate constant shutdowns and effectively save customers up to 16 days of shutdown time each month. Since the genesis of the partnership, Vortex has developed its own controller for the system, which takes full advantage of the CCC products in conjunction with its own products. Vortex has even added a new feature that will automatically trap and combust natural gas to prevent it from being flared. For this feature, Vortex added a CCC FM 50 to measure fuel flow that is captured instead of flared, which reduces emissions and results in less carbon consumption.

For one client with larger units, post-catalyst emissions going out on standard equipment were 13.5 to 14 grams per brake horsepower (g/bhp). After the Vortex install, emissions figures decreased to just 0.5 g/bhp or less. "Emissions are calculated based on how many grams of NO_x per bhp, which was formerly measured in kW power," said Osborne. "Brake horsepower is just a measure of emissions coming out of machines and how efficient those machines are running." Vortex has taken up the responsibility of explaining these calculations to customers who are unfamiliar with them and may otherwise be blindsided by rising carbon taxes as measured using bhp.

"Most of the customers that we have done work for are at, or near, factory emissions," said Osborne. "Most of these customers' equipment emissions output range from 13.5 to 18 g/bhp, but we have seen some as high as 28 g/bhp before installing Vortex systems. Once we started working with them, there hasn't been a single customer that hasn't seen their emissions output fall to below 1 g/bhp. They're seeing excellent fuel savings with around 13% fuel reduction on engines that aren't even fully loaded. The results are saving customers thousands of dollars a month."

CCC has more than 50 years of gas compression industry experience in control systems for managing natural gas for engines and turbines. The company was early to implement ultra-low emissions products for gas engines of all sizes. It has continued to push the boundaries of emissions reductions while also making advancements in semiconductors and miniaturization of electronics onto single-integrated circuits, providing availability and price reductions in rare earth magnets, and offering enhanced knowledge on how best to use voice coil technology for valve actuation. This provides

near frictionless operation of the valves, resulting in years of operation as well as precise and fast control.

CCC expects that the next 50 years will have its fair share of headwinds (see “Staying Power,” September 2020 *Gas Compression Magazine*, p. 26). In the past, CCC was responding to technological challenges by innovating more sophisticated products for its customers. Moving forward, it sees the transition to renewable energy sources as the greatest threat to its business. “Adapting to the pace of change and general negativity toward the fossil fuel industry is the biggest challenge for all of us in this industry,” said Rick Fisher, vice president of sales and marketing at CCC. “We don’t believe that the people pushing to eliminate fossil fuels in the near future understand how clean and efficient we are able to run gas turbines and gas engine compressors with the proper controls. These packages can now run with near-zero emissions and have many benefits over renewables at a very reasonable cost. Countries around the world covet the availability and distribution that the United States and Canada have with natural gas. The main benefit of the green movement is that it is driving control improvements and emissions reductions, although it can be a little naïve to the major benefits of clean natural gas and to the fact that no matter how fast they build wind or solar, they will continue to need clean fossil fuels for many years to come. Companies that don’t innovate or offer clean alternatives will, however, be left in ruin. Natural gas fuel should be seen more as a partnership or bridge with renewables rather than an either/or.”

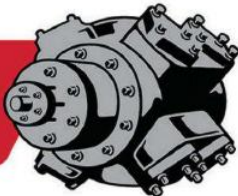
Vortex said that its customers are now actively weighing the pros and cons of emissions reductions. Admittedly, the COVID-19 pandemic pressured many customers to choose cheaper options to endure tough times. However, Osborne said conversations with Vortex’s customers on the long-term advantages of VETS and the CCC system have been constructive. Osborne believes that the VETS and CCC system is the best solution on the market because customers can decrease their total cost of ownership while also reducing their carbon footprint.

The anticipated Canadian government assurance program should help even more customers embrace emissions reductions. “With these new emissions grants, the government is looking at the best options that can be supplied,” said Osborne. “For example, if a system install costs US\$77,000, then the Canadian government will look to evaluate emissions reductions by doing a cost breakdown.”

The cost breakdown would factor in the carbon tax versus the estimated cost of reducing emissions to determine the net cost savings. “As an example, the cost breakdown could determine that a customer could get US\$231 per g/bhp in net savings,” said Osborne. “Vortex is working on a way of explaining these figures to potential clients. So far, we are having success.” Discussing cost savings from emissions reductions with customers is likely to be an increasingly frequent conversation given that new regulation targets are expected to come out in 2026 in addition to the 2030 carbon tax hike.

Continued on page 40

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THE LONG-TERM FIX

In addition to partnerships with companies like Altronic and Vortex, CCC has been developing product offerings that are centered around emissions reductions and cost savings. In 2020, CCC launched the Gas Fuel Shut Off Manifold System, which fits into its primary market of retrofitting gas turbines with older fuel systems and upgrading them with CCC's improved design. Specifically, the product aligns with CCC's AGV valves. "When one of our customers upgrades the fuel control valve, it is common to need to upgrade the shutoff valves as well. A common complaint with some of the older shutoff valves is they tend to stick, and the operator has to hit them with a hammer to get them to open. They always ask if we have an upgrade for the manifold upstream of the metering valve. Now we do," said Rick Fisher.

The manifold comes in a 1.5- and 2-in. (38- and 51-mm) design that aligns with the company's AGV 10 or AGV 50 for small- to mid-sized gas turbines. According to CCC, it's possible to add the Venturi-based FM 50 gas meter to monitor gas consumption and totalize gas flow over a variety of time frames. This fuel consumption measurement can be used to track efficiency and possibly signal the need for maintenance or water wash of the turbine. It can also be used for calculating carbon usage and validating carbon savings for carbon credits.

"The fuel train isolation valve provides shutdown on a gas turbine by rapidly halting the flow of gaseous fuel," said Rick Fisher. "The supply pressure is used to move a spring-loaded piston in the valve. When the valve is energized, gas pressure drives the spring-loaded piston open, admitting fuel to the turbine. When the current signal to the electrical solenoid is interrupted, the spring-loaded 2nd-stage piston changes states to vent off primary control pressure. The main spring then forces the primary piston to the seal, stopping all flow."

A BROAD PERSPECTIVE

Like CCC, Vortex is partnering with a broad and diverse customer base to tackle the industry's latest challenges and improve uptime. Vortex has added insight into industry trends in terms of cost reductions and emissions compliance thanks to its integrated business model that spans different subcategories of the oil and gas value chain. The company operates three divisions. Its packaging division designs and packages technical production equipment as well as conventional compression and power generation packages.

Vortex's services division has one of the largest fleets of mechanical service trucks in Western Canada, with coverage across Alberta and reaching into Saskatchewan and British Columbia. Included in the services division workflow is upgrades to older control systems with the VETS/CCC solution. The system can be installed on engines ranging from automotive natural gas engines (80 hp [60 kW]) up to and including large-horsepower 2250-hp [1679-kW] natural gas engines. Equipment services include full authority fuel valve, fully automatic AFR, emissions compliance (even with changes in heating value or load), rich burn or lean burn control, onboard diagnostics and optional display, catalytic converter housing and elements, easy integration into existing panels and AFR, and control designed to operate with or without the catalytic converter installed.

Finally, the company's structures division manufactures polyurethane panel buildings and distributes wholesale polyurethane panels for the oilfield and construction industries.




A Section Of The FM 50 Gas Meter Flow Measurement Device

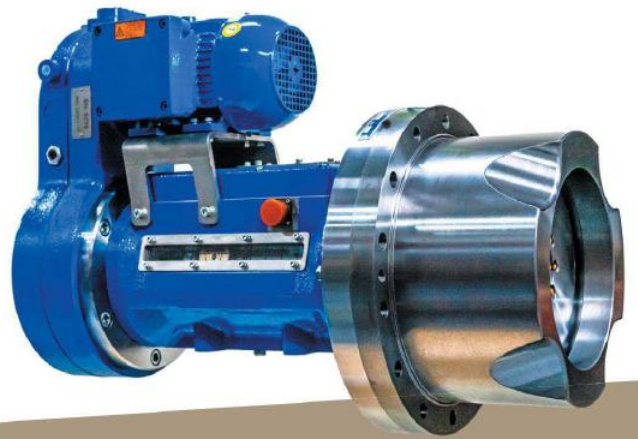
NEXT STEPS FOR VETS AND CCC

On March 15, Vortex announced that its VETS partnership with Altronic and CCC qualifies for Emissions Reduction Alberta (ERA) Small Producers Energy Efficiency Deployment (SPEED) funding. The program supports eligible oil and gas producers in Alberta to reduce GHG emissions and foster job creation. SPEED gives companies incentives up to US\$765,000 per parent company. Over the past year, Vortex cranked up its hiring partially due to the success of VETS. In 2020, it completed 15 installs for five different companies, from Alberta to Ontario. According to Vortex, every system installed has proven successful in reducing NO_x to less than 1 g/bhp and achieving fuel savings upward of 15% at 50% to 60% load.

According to CCC, natural gas can be combined with modern catalyst systems, or other ultra-low NO_x control techniques, to become an ideal transitional technology for a sustainable economy.

One opportunity that sticks out to CCC is renewable natural gas (RNG), which is formed from the biogas produced from the organic waste found in landfills, agriculture, forest byproducts, and wastewater treatment plants (see “Assai Awakens,” February 2022 *Gas Compression Magazine*, p. 36). “RNG is becoming a recognized leading approach to GHG reduction,” said Rick Fisher. “This makes the future of natural gas an essential component of the green economy. CCC’s gas turbine valves allow the user to change the specific gravity in the flow equation to maintain accuracy with a variety of gases or blended gases. Our gas engine products strive to accommodate gases from natural gas to propane with the same fuel valve, which has a heating value from about 923 to 2300 Btu with the same fuel valve. For lower Btu gas, the control is modified to accommodate the change. CCC can also offer blending of various gases such as hydrogen or RNG with methane. Customers can call us with a gas composition and an engine model, and we can provide the appropriate fuel control.” 

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