TESCorp strikes back against methane

Emissions Recovery Unit (ERU) designed to capture leaking emissions. By **DJ Slater**

The fight against emissions is not new to the U.S. Environmental Protection Agency (EPA) or Thomas Energy Systems Corp. (TESCorp). The agency and the company have had greenhouse gases, especially methane, on their collective radars for decades.

As the EPA continues to issue mandates against harmful emissions, TESCorp also issues new products to aid gas compression operators to meet or exceed the agency's standards. The company's latest entry into the emissions battle is the Ventmaster Emissions Recovery Unit (ERU), designed to capture and return vent and leaking gases back into the compressor.

While specifically designed for obtaining emissions from reciprocating compressors, the ERU can also be used on centrifugal compressors, gas-operated control valves and pneumatic pumps, all of which deal with emission leakage.

"The Ventmaster ERU is a new product based upon previous, but larger systems that were engineered for specific applications," said Vince Thomas, founder and president of TESCorp. "The sizing and design capabilities were derived by published EPA documents pertaining to the leaking compressor packing evaluations and its significant contributions to the total methane emissions into the atmosphere."

Adding to the line

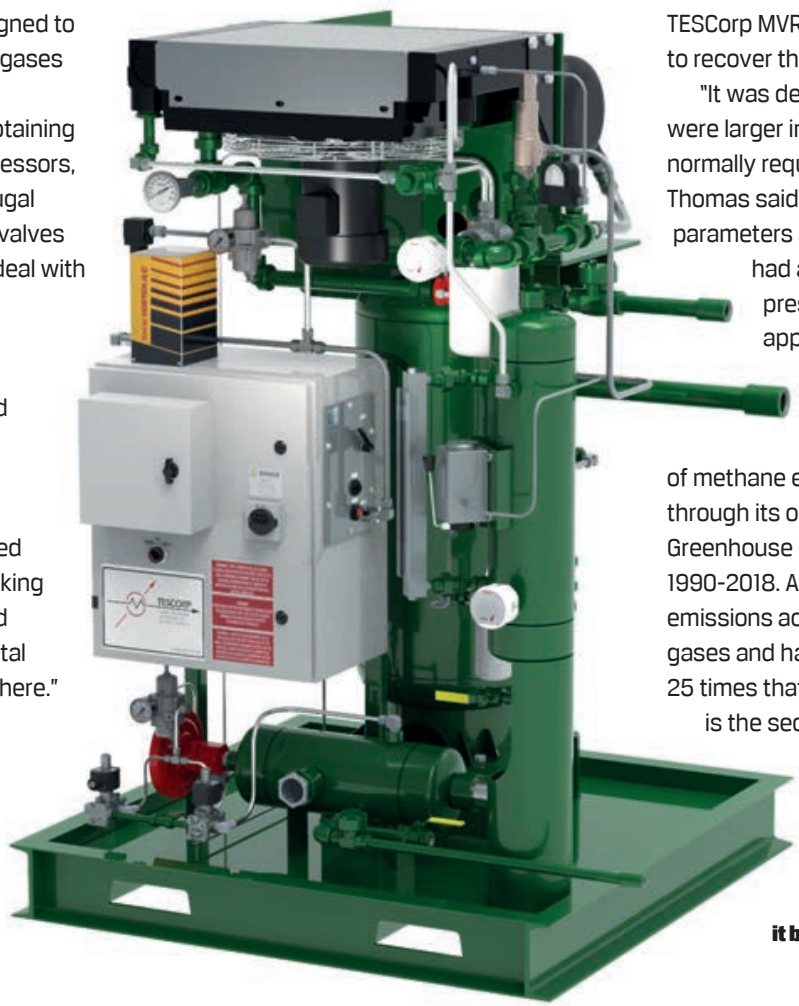
The ERU is the newest addition to TESCorp's Ventmaster line, which it debuted earlier this year (see **COMPRESSOR**TECH², March 2020, p. 43). While the previous four series in the Ventmaster line – the BVR-M (1&2) and the CVR-M (1&2) dealt primarily with saturated gases, the ERU is fine tuned for methane.

The ERU stemmed from the Ventmaster's natural evolution, Thomas said. Over the years, TESCorp has received requests to address emissions for various process gases.

"Working with the state of California a few years ago (regarding their emissions regulations), the issue of compressor packing box and control valve leakage was discussed as another emission issue that needed a solution," he said. "We modified the TESCorp MVR or CVR-M vapor recovery units to recover the leaking emissions.

"It was determined that these systems were larger in capacity than would be normally required for this application," Thomas said. "We specifically set the parameters and designed a system that had a more appropriate capacity and pressure capabilities to best fit the application."

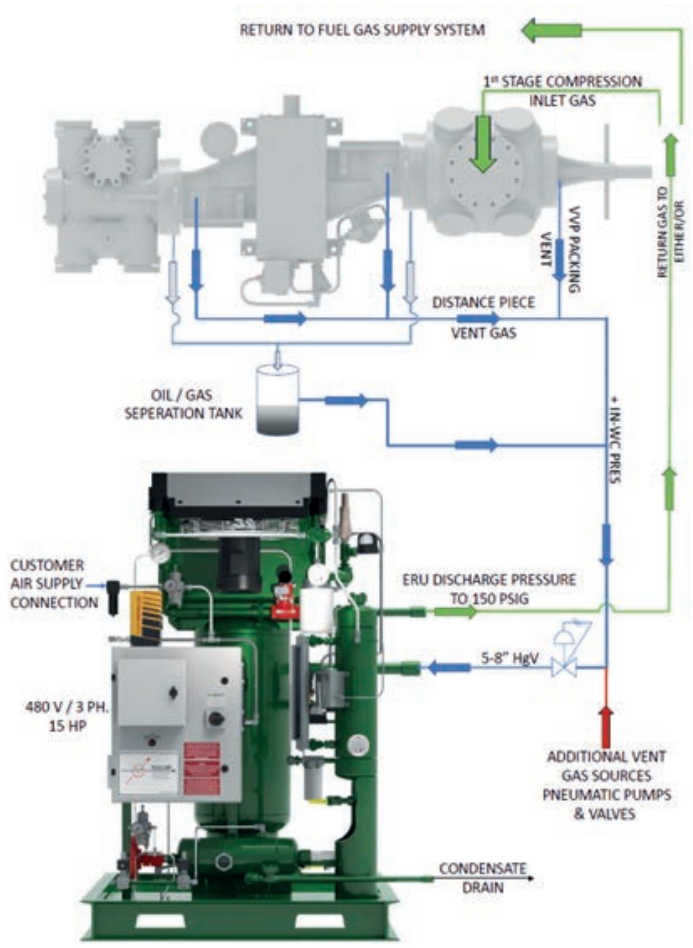
"The system utilizes an internal VFD to maintain a constant vacuum to meet varying flow rates."



The Ventmaster Emissions Recovery Unit (ERU) captures methane from leaking compressor packing and routes it back into the compression process.

The emissions problem

The EPA revealed the gravity of methane emissions in the United States through its own study – Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2018. According to the study, methane emissions account for 9.5% of all greenhouse gases and has a potency equivalent to 25 times that of CO_2. The energy industry is the second-largest source of these



This diagram shows how TESCorp's ERU handles leaking emission from a reciprocating compressor. The unit uses a back-pressure regulator to maintain a positive pressure in the packing case. It then produces a slight vacuum to capture and transport all leaking emissions. Next, the ERU pressurizes the gas to meet the existing pressure inside the compressor to distribute it back into the compression process.

emissions, with methane contributing 175 million tons of CO_2 equivalent ($MMTCO_2e$) annually to the environment.

Of the methane total, 19% came from transmission and storage facilities in the oil and gas industry, which equates to 34 $MMTCO_2e$, according to the EPA study. The breakdown of emission leaks per source consists of: 15 $MMTCO_2e$ from gas compression equipment seal and packing leaks; 11.9 $MMTCO_2e$ from reciprocating compressors; 3.1 $MMTCO_2e$ from centrifugal compressors; and 0.68 $MMTCO_2e$ from gas-operated pneumatic controllers.

Additionally, the study also found that the gas processing industry added 12 $MMTCO_2e$ of annual emissions to the mix, with similar amounts for the same sources.

For reciprocating compressors, the main target of the ERU, leaks typically occur from four areas – around the packing case through the nose gasket, between the packing cups, around the rings and between the rings and piston rod, Thomas said.

With more than 51,000 reciprocating compressors in operation across the United States emitting about 72.4 Bcfy (2×10^9 m^3/y), TESCorp knew it had an issue it needed to address, Thomas said.

The ERU

The ERU-1250 features an encapsulated 15 hp (11.2 kW) scroll compressor without packing or seal to prevent its own leaks. The unit also includes a three-phase 460 Vac variable frequency drive (VFD) with a controller for automatic operation and capacity control. The controls are NEC Class I, Division II rated and include a customer interface and local fault annunciation.

The unit also has a vacuum receiver with a condensate blow case for removing and eliminating produced condensates. An optional weather-proof enclosure protects the unit, which takes up a 4 x 4 ft. (1.2 x 1.2 m) footprint. The unit has capacities of 1250 cfh (35.4 m^3/h) and discharge pressures up to 150 psi (10.3 bar).

The ERU recovers the gas from the compressor packing box by using a back-pressure regulator to maintain a positive pressure in the packing case. The vapors are then evacuated by the unit, which produces a slight vacuum as needed to capture and transport all leaking emissions.

The unit then pressurizes the recovered gas to meet the existing pressure needed to re-enter either the first stage of the compressor or the compressor fuel gas systems for use in the current process.

"Volumes vary as the packing leakage changes, control valves actuate or pumps are operated," Thomas said. "The system utilizes an internal VFD to maintain a constant vacuum to meet varying flow rates."

Industry relevance

While many think of the ERU assisting in their methane mitigation goals in the field with worn equipment, Thomas said even new packing leaks, making the unit useful even after replacing worn packing.

"Presently, the common solution to this issue is to apply new compressor packing solutions to minimize leakage," Thomas said. "But, it is understood that all packing does leak, even newly installed with the associated proper maintenance of piston rods, lubrication and components.

"The ERU would recover all gas leakage from new to worn packing allowing the operator to maintain a zero leakage, meet EPA and state mandates while recovering valuable product," he said. "Although the packing or gas seals will still require maintenance, these intervals may be greatly extended therefore reducing both service and downtime costs."

As the ERU hits the market, Thomas can't help but reflect on his company's tenure in the emissions fight and how this new unit continues to aid the cause.

"Our engineering staff has been involved in vapor emission recovery since 1975," he said. "We were recovering waste emissions for both the economics associated with these gases and also their environment effects prior to the EPA mandates. It is exciting to address an issue and introduce a solution to that issue." CT2