Clark Natural Gas Engines

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Protection of Oil and Gas Field Equipment Against Corrosion

GETT Gas Compressor Guide

GETT Gas Compressor Guide

Vols. 24, no. 3-v. 34, no. 3 include: International industrial digest.

This book is written as a companion to my book on Gas Engines, (ISBN: 978-1-7345214-0-5). However it can also serve as a stand-alone text. There is nothing magical about reciprocating compressors, how they work or about maintaining them, but they do command respect since they are often compressing highly explosive or toxic gases. As do most authors of text books I will begin with theory. To know how something works is a prerequisite to knowing how to fix it. Many people consider theory a dull topic, but it goes hand in hand with operation and maintenance. So I will begin this book with theory and connect all of the systems in between. Some of the images used herein are sourced from various gas engine/compressor manufacturers including Cooper-Bessemer, Dresser-Clark, Worthington, and Ingersoll-Rand. I took most of the actual photographs while employed by an O.E.M. for over thirty-seven years. While a solid knowledge of compressor theory is critical to understanding how a compressor works, I cannot teach theory without the reader being familiar with the basic Gas Laws and the basic components. Each one of the components and systems illustrated here will be examined in detail by the end of the book. But for now, the basic parts are described very briefly in the introduction. Study the drawing and fix in your mind the names and locations of these major components. Reciprocating Compressors of every size and make are comparable in design and the parts similarly named. Where there are significant differences they will be pointed out.The first time specialized words or terms are used they will be underlined and in this font. Their definitions will be found in a glossary at the back of the book. The numbers of personnel qualified to operate and repair these compressors is facing a shortfall due the retirement of an aging workforce. This has created a need for people in the oil and Gas industry who are formally educated in the maintenance of this equipment. This book provides a good introduction for those seeking employment in the industry.

Gas Journal

Nitric oxide (NO) and nitrogen dioxide (NO_2) generated by internal combustion (IC) engines are implicated in adverse environmental and health effects. Even though lean-burn natural gas engines have traditionally emitted lower oxides of nitrogen (NOx) emissions compared to their diesel counterparts, natural gas engines are being further challenged to reduce NOx emissions to 0.1 g/bhp-hr. The Selective NOx Recirculation (SNR) approach for NOx reduction involves cooling the engine exhaust gas and then adsorbing the NOx from the exhaust stream, followed by the periodic desorption of NOx. By sending the desorbed NOx back into the intake and through the engine, a percentage of the NOx can be decomposed during the combustion process. SNR technology has the support of the Department of Energy (DOE), under the Advanced Reciprocating Engine Systems (ARES) program to reduce NOx emissions to under 0.1 g/bhp-hr from stationary natural gas engines by 2010. The NO decomposition phenomenon was studied using two Cummins L10G natural gas fueled spark-ignited (SI) engines in three experimental campaigns. It was observed that the air/fuel ratio ({lambda}), injected NO quantity, added exhaust gas recirculation (EGR) percentage, and engine operating points affected NOx decomposition rates within the engine. Chemical kinetic model predictions using the software package CHEMKIN were performed to relate the experimental data with established rate and equilibrium models. The model was used to predict NO decomposition during lean-burn, stoichiometric burn, and slightly rich-burn cases with added EGR. NOx decomposition rates were estimated from the model to be from 35 to 42% for the lean-burn cases and from 50 to 70% for the rich-burn cases. The modeling results provided an insight as to how to maximize NOx decomposition rates for the experimental engine. Results from this experiment along with chemical kinetic modeling solutions prompted the investigation of rich-burn operating conditions, with added EGR to prevent preignition. It was observed that the relative air/fuel ratio, injected NO quantity, added EGR fraction, and engine operating points affected the NO decomposition rates. While operating under these modified conditions, the highest NO decomposition rate of 92% was observed. In-cylinder pressure data gathered during the experiments showed minimum deviation from peak pressure as a result of NO injections into the engine. A NOx adsorption system, from Sorbent Technologies, Inc., was integrated with the Cummins engine, comprised a NOx adsorbent chamber, heat exchanger, demister, and a hot air blower. Data were gathered to show the possibility of NOx adsorption from the engine exhaust, and desorption of NOx from the sorbent material. In order to quantify the NOx adsorption/desorption characteristics of the sorbent material, a benchtop adsorption system was constructed. The temperature of this apparatus was controlled while data were gathered on the characteristics of the sorbent material for development of a system model. A simplified linear driving force model was developed to predict NOx adsorption into the sorbent material as cooled exhaust passed over fresh sorbent material. A mass heat transfer analysis was conducted to analyze the possibility of using hot exhaust gas for the desorption process. It was found in the adsorption studies, and through literature review, that NO adsorption was poor when the carrier gas was nitrogen, but that NO in the presence of oxygen was adsorbed at levels exceeding 1% by mass of the sorbent. From the three experimental campaigns, chemical kinetic modeling analysis, and the scaled benchtop NOx adsorption system, an overall SNR system model was developed. An economic analysis was completed, and showed that the system was impractical in cost for small engines, but that economies of scale favored the technology.

Marine Gas Engines, Their Construction and Management, by Carl H. Clark, S.B.

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The Gas Record

Brown's Directory of American Gas Companies ...

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Marine Gas Engines, Their Construction and Management

Selective NOx Recirculation for Stationary Lean-Burn Natural Gas Engines