

Automated Dynamic Dilution Sampling System

Background

Demonstrating environmental compliance when using an air pollution control systems (APC) often requires measuring composition upstream and downstream of the APC to determine control efficiency. The upstream (high concentration) measurement can be especially challenging due to limitations of the gas analyzer range and safety concerns for toxic or flammable gases.

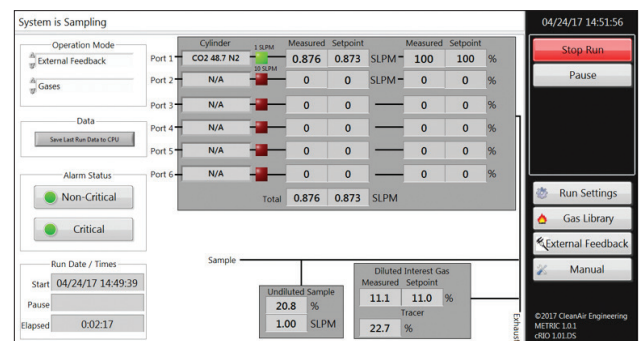
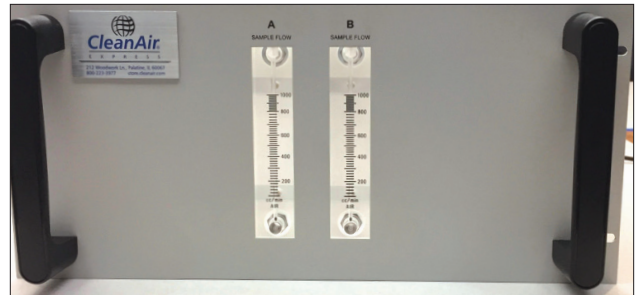
A client required characterization of the total volatile organic compound (VOC) destruction efficiency from an APC device. The inlet gas stream to the APC had unknown composition and widely varying total VOC concentration ranging from < 1% to potentially 100% VOC limiting the use of conventional measurement strategies such as orifice-style dilution systems (due to continually changing molecular weight). Additionally, the gas stream had a high flammability risk because it contained flammable compounds and oxygen.

CleanAir's Approach

CleanAir designed a system to continuously deliver a precisely metered volume of dilution gas to the sample stream so that only this diluted gas stream is extracted and measured. The system dynamically adjusts the dilution ratio based on feedback from an external gas analyzer to maintain the diluted VOC concentration at a given setpoint. Additionally, a control program with user interface was created to provide real-time and logged values of the undiluted sample concentration and undiluted sample flow rate.

Results

The custom dilution system allowed for measuring gas composition over the wide range of VOC concentrations present, while reducing safety risks by diluting the gas below its lower flammability limit. This allowed CleanAir to determine APC control efficiency for a variable gas stream that exceeds the concentration ranges measurable for many instruments.



Summary

CleanAir designed a custom, dynamic, automated dilution sampling system that provides real time and logged undiluted concentration.