

CASE STUDY

EMISSIONS ANALYSIS

Optimization and safety in industrial engines

OVERVIEW

There are many types of industrial internal combustion engines, both stationary and mobile, that can run on gas or diesel. Engines can even run on **lean combustion** with a high AFR (Air to Fuel Ratio) or **rich combustion** with a low AFR ratio.

THE PROBLEM

Combustion exhausts contain polluting gases such as CO, NO, NO₂, NO_x and potentially high levels of combustible hydrocarbons, along with particulate matter. Measuring these emissions is fundamental for several reasons.



PERFORMANCE AND SAFETY

Emissions analysis helps fine tuning the combustion process, thus increasing performance and safety.



ENVIRONMENT REGULATIONS

Monitoring processes allows user to find potential needed adjustments to follow important emissions regulations.

IMPORTANCE OF O₂ MEASUREMENT

Measuring the O₂ and CO levels **immediately after the combustion process** and before the gases reach the catalyst converter gives an idea of just **how lean or rich the combustion is**. This value can be utilized to **fine-tune** the process and **optimize** performance and safety.

Another reason to measure the O₂ level of the **post-catalyst exhaust gas** is that most emissions reporting must be done for a given reference level of O₂. The typical **O₂ reference level for engines is 11% to 15%** (contact your local environmental authorities for value in your area).

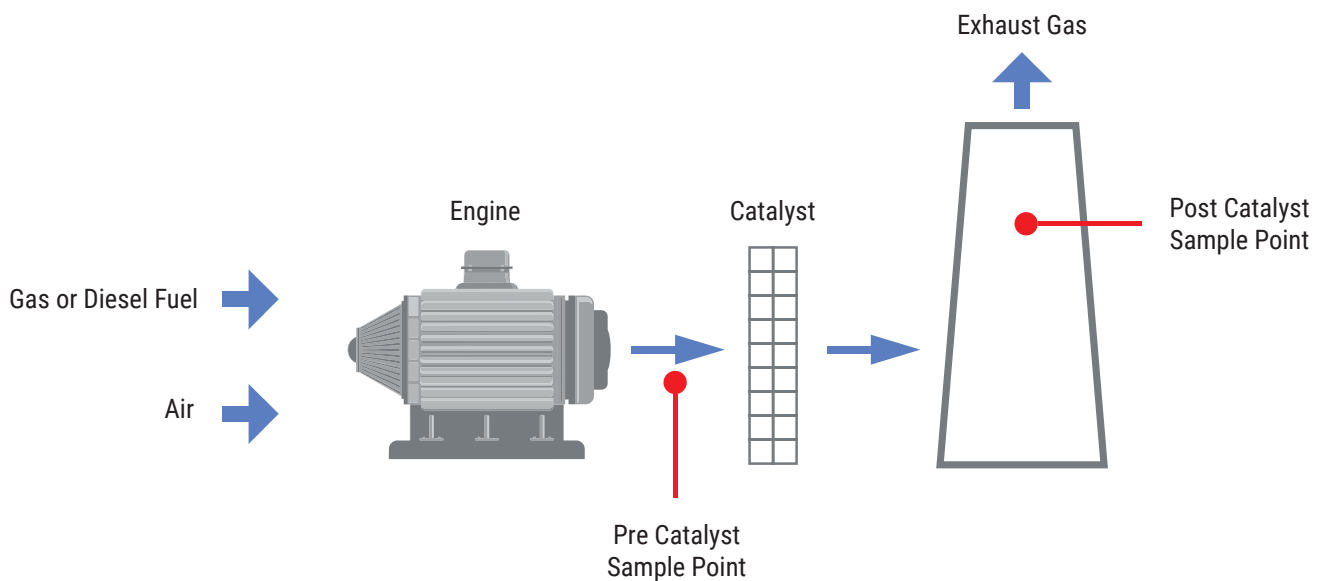
THE ROLE OF C_xH_y, CO, NO_x

Engine emissions (CO, NO_x) are most often reported in units of parts per million (ppm) and grams per brake horsepower hour (g/bhp-hr). Emissions in ppm units can be converted to g/bhp-hr as a function of the thermal efficiency rating of the engine.

Significant levels of C_xH_y hydrocarbons over recommended limits are indicative of excess

fuel, underlining the need for further adjustment to solve a problem with a **high-risk potential**, especially in engines using natural gas.

It must be considered that the presence of large concentrations of CO, NO_x or hydrocarbons in the chimneys means **dangers for both health and safety**, hence why such are regulated by national laws.



PRODUCT SOLUTION



TOOLS

Novo
Chemist 600 e 600 Be Green
Chemist 900



GASES

CO, CO₂, NO_x (NO+NO₂), SO₂, H₂S, C_xH_y

In order to perform the described measurements Seitron offers three portable analyzers: Novo (up to 4 gases), Chemist 600 (up to 6 gases), Chemist 900 (up to 12 gases). These analyzers can all be equipped with O₂, CO, NO and NO₂ sensors, and are capable of measuring the total C_xH_y and NO_x (NO+NO₂), amongst others.