



Politecnico
di Bari

- ✓ **GAS DILUTION**
- ✓ **CONTROLLED FLOW TO BE FED TO A MASS SPECTROMETER**

A SOLID BUSINESS CASE IN COLLABORATION WITH **THE "POLITECNICO DI BARI"**

GENERAL INFORMATION ABOUT THE PROJECT



TARGET OF THE PROJECT:

Dilution&Sampling Systems for Portable Hydrocarbon Spectrometers



DEPARTMENT:

PolySenSe Lab



HEAD OF PROJECT MANAGEMENT:

Vincenzo Spagnolo



ROLE OF MCQ INSTRUMENTS:

To dilute the gas sample and generate a controlled flow to be directly fed to the mass spectrometer

MORE INFORMATION ABOUT THE HEAD OF THE PROJECT

Vincenzo Spagnolo received the degree (summa cum laude) and the PhD, both in physics, from University of Bari. He works as Full Professor of Applied Physics at the Technical University of Bari.

Since 2017, he is the director of the joint-research lab PolySense, created by THORLABS GmbH and Technical University of Bari, devoted to the development and implementation of novel gas sensing techniques and the realization of highly sensitive QEPAS trace-gas sensors.

DESCRIPTION OF THE APPLICATION AND THE TARGET

The real time and in-situ analysis of natural gas composition is a powerful tool in oil&gas industry for estimating reserves, rock characterization and assisted drilling. Laser based optical techniques represent suitable solutions for addressing this tasks, since they exploit the laser's narrow spectral resolution and allow for unambiguous detection of trace gas for each component in downhole samples. To date it has been demonstrated that trace gas species can be optically detected with sensitivities down to parts - per - quadrillion concentration levels when operated in controlled environment, such as research laboratories. Therefore, laser-based techniques are excellent candidate for hydrocarbon

identification in the part-per-billion up to part-per-million concentration scale for real world applications. The biggest challenge is rather the extension of detection dynamic range to the percent scale. Infact, a typical sample of natural gas contains >80% of methane and the rest divided among the heavier molecules such as ethane, propane, butane. In this context, the concentrations to be measured are way beyond the sensitivity of the spectrometer and absorption non-linearity as well as saturation in the sensor response may occur. One of the smartest solution to address these issues is the dilutions of the natural gas mixture with pure nitrogen in ratios that can vary from 1/10 down to 1/20.

BENEFITS AND SAVINGS

The gas blender GB100 Series turned out to be a reliable and compact device for diluting the gas sample and generate a controlled flow to be directly fed to the spectrometer. With this configuration the sensor is able to operate in a comfortable range, measure the hydrocarbon concentrations and re-calculate the actual values according to the dilution ratio used. The potential developments for in-situ gas analyzers is the integration of dilution/sampling systems inside the sensors.



GAS MIXER VS MASS FLOW:

The GAS MIXER channels it's more compact than typical flow controller meters and can be specifically calibrated on the mixture to be used.



WITHOUT MCQ? (HARD)

3 Mass Flow Controllers with Power control Unit, tubes, NO-Software and different Gas Mixture Cylinders.



TIME SAVINGS:

Instead of changing a calibration cylinder for each point, our Gas Mixer uses pure gas allowing the Politecnico di Bari to set all the desired calibration points in just a few steps.



SOFTWARE AUTOMATION:

Thanks to our Software PRO version and its option 'Automatic Program', now Politecnico di Bari can bring forward experiments in automation, painlessly.



MICRO FLOWS - NO CUT OFF:

OUR GB100 Series allows you to control the flow in all the calibration range, from 0,1 mL/min to 500 mL/min with NO cut-off



REVIEW IN PILLS:

We helped Polysense to get highly precise and stable micro flows of gas to feed a spectrometer in a easy way thanks to our instrument and software.

READY TO TALK ABOUT YOUR SOLUTION?

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