DATATRANSLATION®

# Gas Analyzer Simulation Using Measure Foundry

Challenge

Simulate the entire physical gas analyzer system without the need to use real gas. This will enable the company to test the entire electrical system without introducing errors that are typical in a real physical system.

Solution

Create a custom equation using the Melting Pot in Measure Foundry. Using objects with the variables connected to sliders and controls allowed the Company to control the parameters of the equation interactively, with the results being sent directly to a waveform D/A converter.

Results

- Fully simulated gas analyzer system created through software.

- Real world errors reduced.

- Observed results are reliable and repeatable.
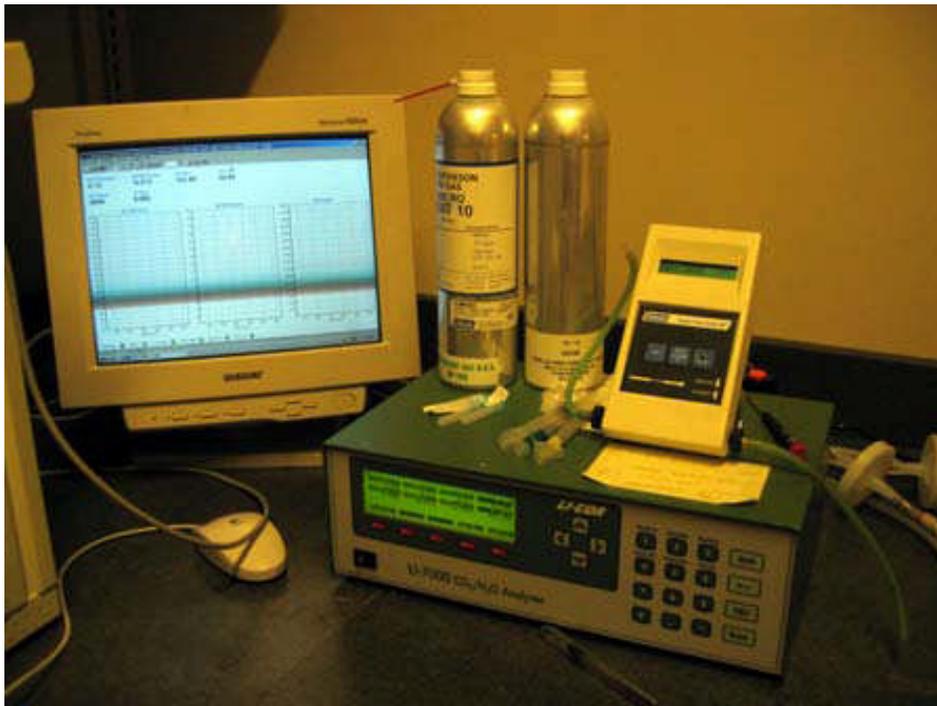
Challenge

This customer, a worldwide producer of gas analyzer systems, wanted to test their analyzers without having to introduce real gas into the system. This would save time, money, and create a safer work environment. The challenge was to simulate the entire physical system and be able to change every single parameter of the mathematical equation on the fly. They then wanted the resultant electrical signal to be the input signal to the analyzer in real time. In essence, they needed an arbitrary waveform generator that allows for real-time programmable variables.

Usually the function of an arbitrary waveform generator needs to be defined before you are uploading the waveform to the generator which in this case would not work.

Objective:

Simulate the entire physical system without the need to use real gas enabling the company to test the entire electrical system without errors typically introduced by real physical systems.
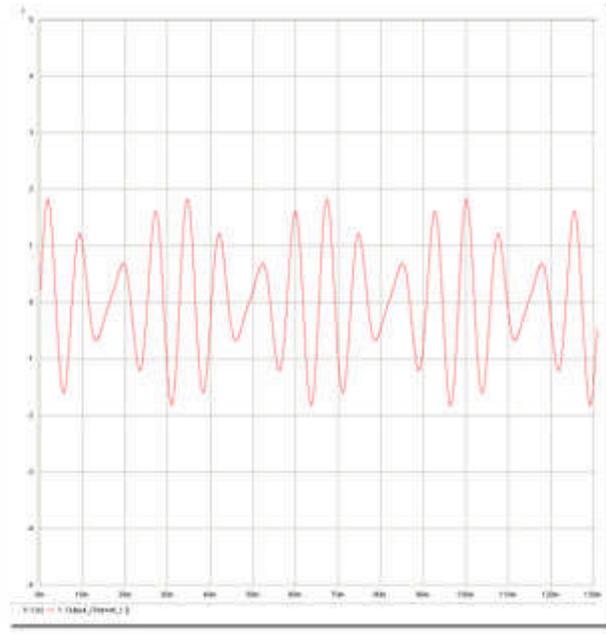
Solution:
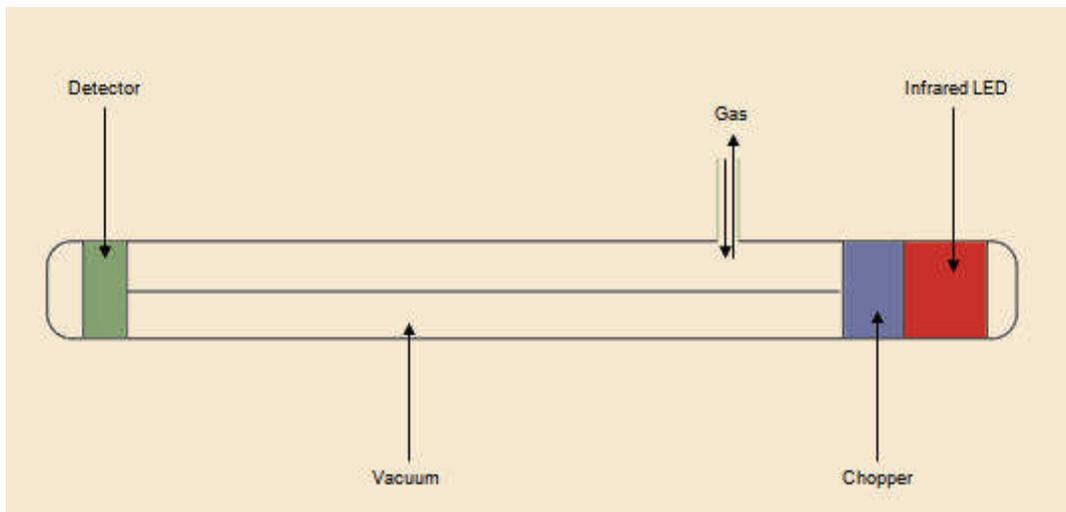
Infrared light is sent through the two chambers, one with the gas and one without (a vacuum). The detector compares the two to determine how much gas is present.
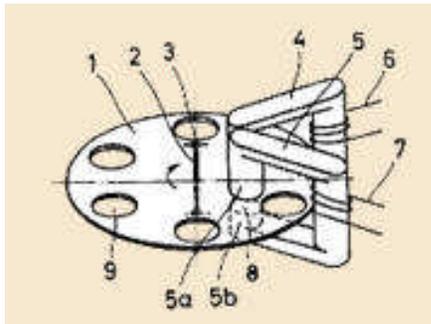
The light gets interrupted by the chopper wheel and the detector induces a voltage that looks like the graph.

Measure Foundry solution:

Using the equation f(x)=A0*(sin(2π*1/f)+(A1*(1-Absorption)*sin5* 2π*1/f)+φ) and a Melting Pot object with the variables connected to sliders and control objects to control the parameters of the equation. The results are sent directly to the waveform D/A converters which clocked the signal out immediately on a Data Translation USB module.

The entire system was simulated and completed in under one day.

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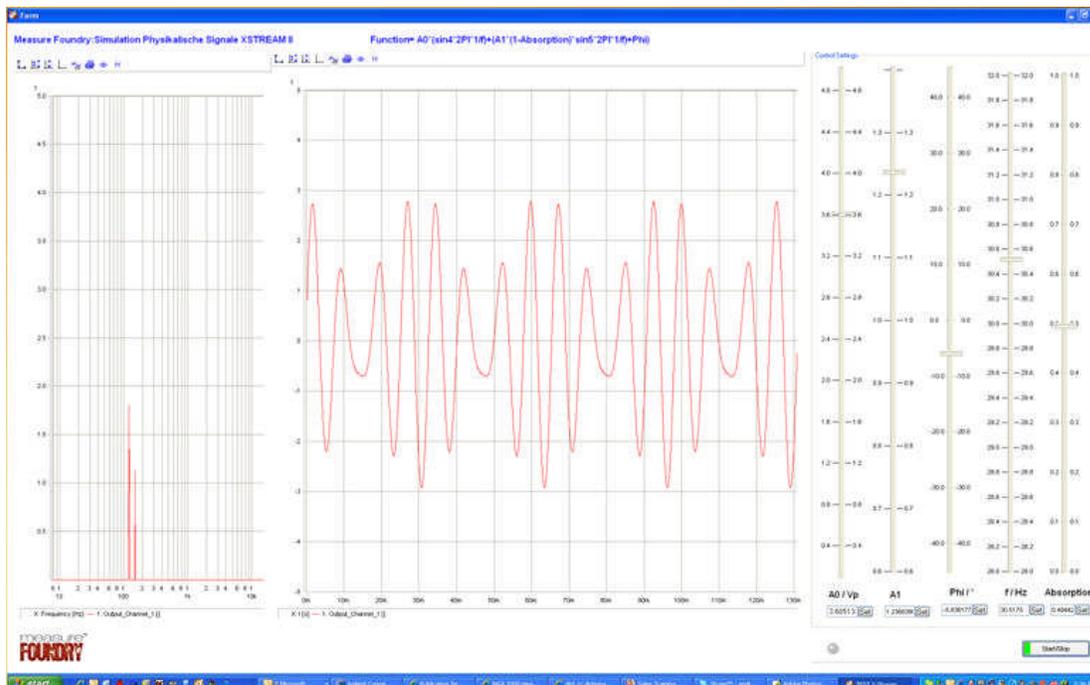
Results:

- **Fully simulated gas analyzer system created through software**. Using the Melting Pot in Measure Foundry and custom algorithm, the entire physical system could be recreated in just one day.

- **Real world errors reduced.** Because the test system does not require actual gasses to be introduced into the system, errors associated with this process are eliminated.

- **Observed results are reliable and repeatable.** The test results generated by this simulated system are now reliable and repeatable.