



# HIGH-PRECISION OXYGEN MEASUREMENT



## Petrochemical

“To measure the input (utility) and output (oxygen) is a key challenge for successful business with our partners. The team has demonstrated that clamp-on ultrasonic technology can accurately be used as contractual measurement for high pressure oxygen.”



*Jean-François Rauch, Smart & Innovative Operation // Senior Oxygen System Expert at Air Liquide*



## Measuring Task

### Retrofit of billing meters for oxygen at the world's largest oxygen production site

In July 2020, Air Liquide finalized its acquisition of Sasol's 16 Air Separation Units (ASU) located in Secunda, South

Africa, and started operating the biggest oxygen production site in the world. The 16 ASUs are being operated by Air Liquide Large Industries South Africa (ALLISA) with a total installed capacity of 42,000 tonnes per day. Since 2018, Air Liquide has been operating a 17th ASU for Sasol on the Secunda site, with a total production capacity of 5,000 tonnes per day. Air Liquide has brought to the site its expertise in implementing highly mastered operational practices, state of the art technologies, modernization investments and digital capabilities to optimize the operation of the ASUs and the energy consumption. The company aims to reduce CO2 emissions from the site by 30% to 40% within the next ten years.

The oxygen plant had previously been integrated within the chemical complex and had been part of an internal system with minimal individual measurements needed. However, the acquisition created a situation where Air Liquide and Sasol would need to bill each other for products and utilities. Due to the large volumes being traded, metering accuracy, reliability and repeatability are essential to both companies. In addition, the size and

complexity of the plant, numerous measuring points such as the high-temperature oxygen lines and headers with temperatures of ~ 250 °F need to be monitored. Installing a traditional metering system would require a downstream factory shutdown. With high costs and long execution timing, combined with its critical impact on the whole Sasol ecosystem, this presents no feasible option.



## Solution

### The installation of a permanent ultrasonic clamp-on in parallel with a custody flowmeter

Flexim approached Air Liquide with its quad channel FLUXUS® G706 meter designed to provide the best possible performance via a non-intrusive measurement. A benchmarking test was conducted comparing Flexim’s FLUXUS® G706 to a wetted multi-path custody transfer flowmeter, which is installed on Air Liquide’s T17 Air Separation Unit. The tests were carried out with support from Flexim’s flying squad technical support team and the local South African sales engineer. The commissioning was done with no interruption to the normal plant operations and in full compliance with the safety and COVID-19 protocols.

The FLUXUS® G706 quad beam meter was selected as it is suitable for both the high and low temperature oxygen measurement, and the averaging of the multiple sound paths provides increased accuracy especially where there are non-ideal inlet conditions. Another advantage is the inbuilt flow computer reducing complexity and cost. Simultaneous reporting of both flow and diagnostic data is achieved via the Modbus protocol. In order to achieve the maximum accuracy possible special care had to be taken in making sure the specific grade of steel speed of sound was used.

The comparison to the custody transfer meter now contains input and experience from more than one year, including a planned shutdown to give the opportunity to observe the meter’s low flow performance. One lesson learned was to activate the “turbulence” mode, although the meter was working well at normal operating flow rates, increasing these to max resulted in a more erratic signal. The activation of turbulence mode solved this and Air Liquide now has confidence in the meter over the full range of expected flow rates.

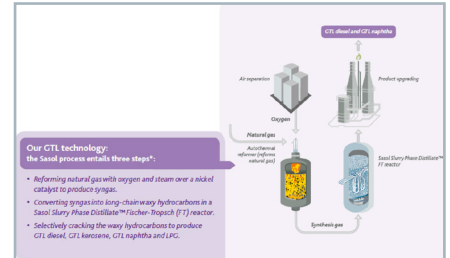
## Outlook

Building on the successful launch, the team continues the implementation across all sites involved, expecting its completion middle of this year.

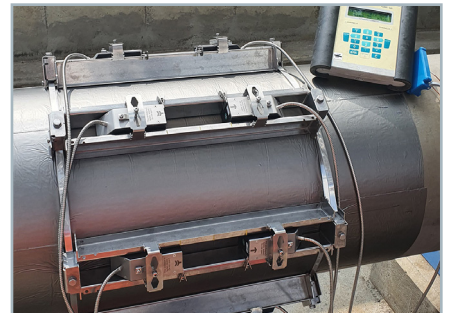
“I would like to warmly thank the Flexim team for their responsiveness, their super professionalism and the very high level of technical expertise.” Jean-François Rauch, Smart & Innovative Operation // Senior Oxygen System Expert at Air Liquide



Air Liquide’s air separation plant at Sasol’s Secunda petrochemical complex  
© Air Liquide



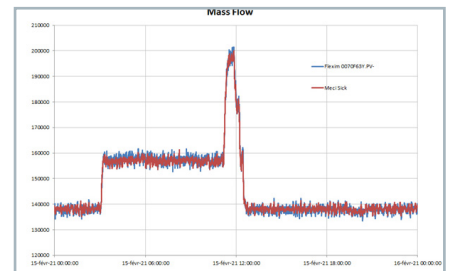
Sasol’s proprietary gas-to-liquid (GTL) technology © Sasol



Meticulous setup of the four channel flow measuring point with the help of the portable FLUXUS® G601



Measuring point with the stationary four channel FLUXUS® G706 ultrasonic flowmeter



The measured data match perfectly to those of the installed inline custody transfer flow meter.

## Measuring Points and Instrumentation

**Medium**

oxygen

**Devices used**

stationary high-precision four channel FLUXUS® G706 ultrasonic flowmeter system for gases with 4 pairs of clamp-on ultrasonic transducers type GRH (Lamb wave), mounted in Variofix C (stainless steel)

## Advantages

- Complete 4 channel 8 sound path meter and flow computer
- Can measure gases of temperatures over 210 °F
- Diagnostics can be tracked to monitor meter performance and accuracy
- Single channel transducers can be swapped out without affecting the calibration or stopping the measurement.
- Flexim's non-intrusive measuring technology is cheaper on both CapEx and installation costs, in addition there is no requirement to have a standalone flow computer.
- Significantly shorter delivery time than inline meters.

### Customer:

#### Air Liquide, Secunda, South Africa

A world leader in gases, technologies and services for Industry and Health, Air Liquide is present in 75 countries with approximately 66,400 employees and serves more than 3.8 million customers and patients.

Sasol is a global integrated chemicals and energy company spanning 30 countries and rooted in South Africa.

Construction of its Secunda complex commenced in 1976. Air Liquide has provided technical and engineering support to Sasol in Secunda since 1979.

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