



# ORBITAL

## Development of Real-time Gas Quality Measurement



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## The Issue

- More gas sources and variation in natural gas quality worldwide
- Total energy flow calculation requires simultaneous and accurate measurement of both gas volume and gas calorific value (CV).
- Flow data is instantaneous but CV data is delayed by several minutes.
- If CV of gas is changing then there is an inherent error in the energy flow calculation.
- The error is compounded if the volumetric flow is also changing.
- **The requirement is therefore the development of an instrument to give as near real-time CV measurement as possible and provide time-matched flow and CV data.**



# The Solution

- **GasPTi**
- A new instrument for gas quality measurement to provide:
  - Fast response
  - Accurate sampling and measurement
  - Wide applicability
  - Easy installation, on-site configuration and rapid commissioning
  - Simple operation and low maintenance

# ➤ GasPTi Integrated Sampling, Conditioning & Analysis

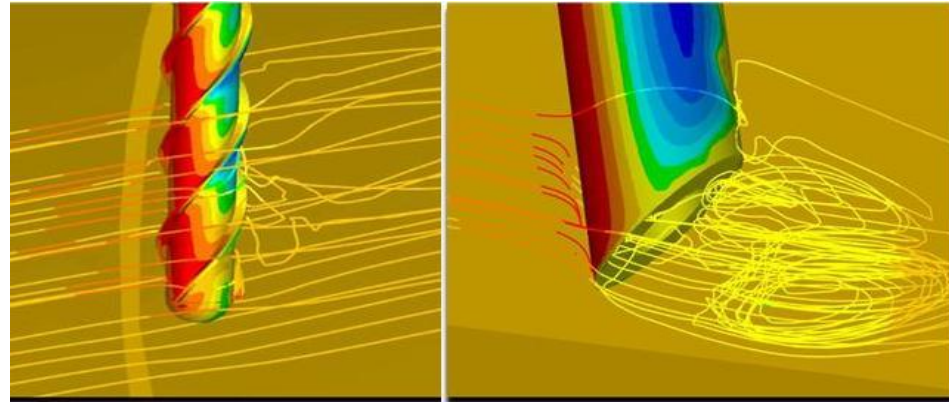
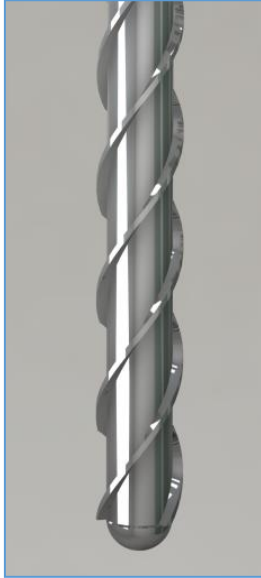


- Gas Sampling
  - VE technology eliminates probe vibration
  - Fixed or retractable probe
  - Small gas sample for rapid response
  - No contamination of gas sample
- Gas Conditioning
  - Short sample line
  - In-line filter
  - Sample gas preheater
  - Optimised flow path – no dead spaces
  - Pressure let-down & Flow controls
  - Rapid & representative conditioning
- Gas Analysis
  - GasPT fast response
  - Inferential device
  - Accurate CV, RD, Wobbe, z & others



# Gas Sample Probe

- Patented VE Technology®
- Helical strake design eliminates vortex shedding
- Removes the need for wake vibration calculations
- Eliminates potential probe failure & pipeline stress cracking



- Aerodynamic tip profile minimises disruption to flow lines
- Rejects particulates to enable significantly reduced filtration
- Smaller sample volume
- Improved accuracy
- Probe tip and internal tubing have electropolished surfaces



# Gas Conditioning Enclosure

- Pipeline mounted
- Low volume sample
- No significant dead legs or changes in flow path
- Small in-line filter
- Preheat prior to pressure cut to counter Joule Thomson cooling effect
- Final pressure and flow controls
- Fast flow loop if required





# GasPT Principles of Measurement

- Measures:
  - Speed of sound
  - Thermal conductivity
  - Carbon dioxide
- Infers:
  - 5 component gas mix
  - CH<sub>4</sub>, C<sub>2</sub>H<sub>6</sub>, C<sub>3</sub>H<sub>8</sub>, N<sub>2</sub>, CO<sub>2</sub>
- Calculates from ISO6976:
  - CV
  - RD
  - Wobbe
  - Compressibility
  - MON, Methane Number
- Output Comms. via Safety Interface:
  - RS485, Ethernet on MODBUS



## ➤ Certification & Approvals

- Baseefa approved as equipment suitable for Zone 1 hazardous areas.
- Certification compliance with ATEX, IECEx and CSA regulations.
- Approval by American Bureau of Shipping for LNG tanker installations.
- CE marked (compliance with EU Electro Mechanical Compatibility regulations and Low Voltage Directive).
- Further approvals are being sought for FM (USA) and TIIS (Japan).





# Customer Testing

Comprehensive laboratory and field tests in:

UK	SGS	for	Ofgem & National Grid
Netherlands	DNV Kema	for	Gasunie
Netherlands	Effectech	for	Shell
Spain	Enagas & Repsol		
Poland	PGNiG	for	GazSystem
Italy	Snam Retegas		
USA	Colorado St. Uni.	for	PRCI
Canada	Novachem	for	TransCanada
Columbia	CDTdeGas	for	TGI
Mexico	Fermaca		

Tests in progress:

Norway	Statoil
Turkey	IGDAS
Thailand	PTT
Japan	Tokyo Gas



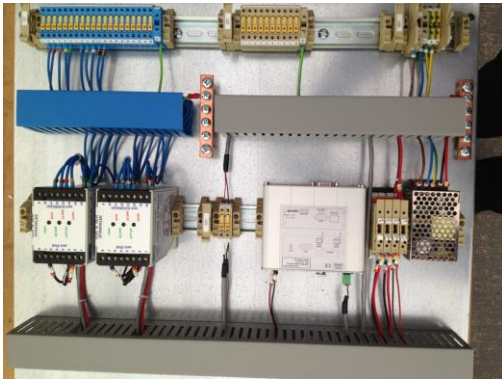
# ➤ Installation & Data Retrieval in less than 2 hours



1. Isolate gas and install sample probe with block valve.



2. Install enclosure. Connect gas, power & comms. Adjust sample pressure and flow.



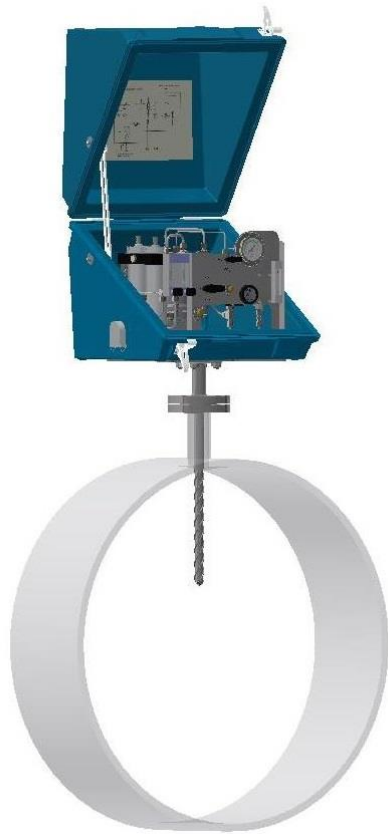
3. Connect field wiring & power up.



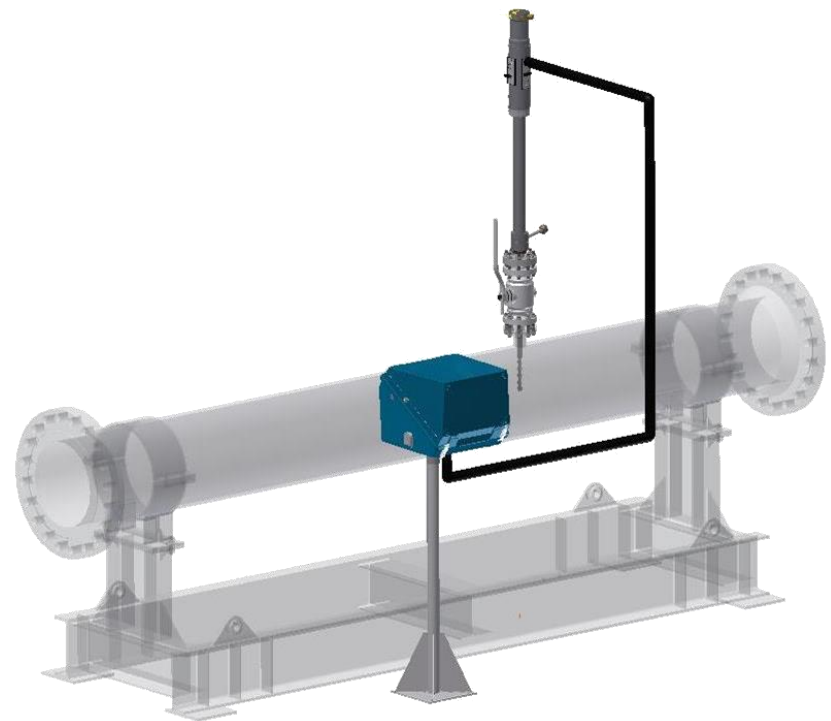
4. Configure comms & data retrieval.

# ➤ Installation Options

Fixed Sample Probe  
Direct Mounted



Retractable Sample Probe  
Indirect Mounted



# ➤ The Change in Installation Time and Cost



FROM



TO





## Conclusions

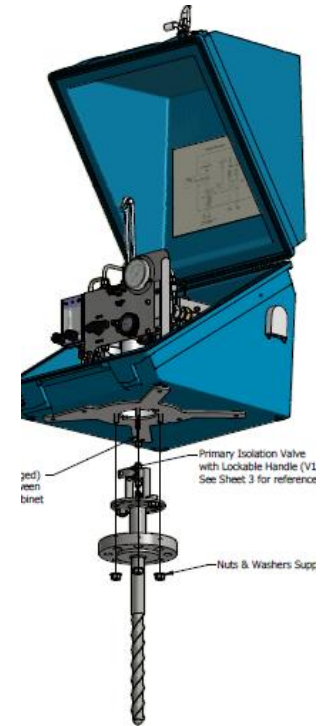
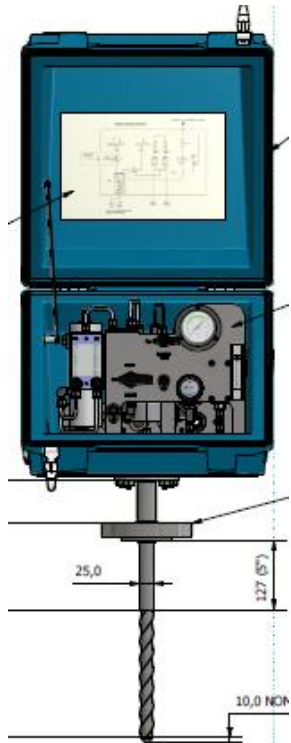
- A new integrated sampling, conditioning and analysis system GasPTi has been developed to give fast, accurate monitoring of pipeline gas quality.
- GasPTi has undergone comprehensive laboratory and field trials to show CV and Wobbe measurement error typically less than  $\pm 0.3\%$ .
- GasPTi meets the performance requirements of OIML R 140 (Europe) and AGA Report No.5 (N.America) as a Class A instrument.
- T90 response to 90% final value for a CV step change is less than 10 seconds from sample point to analyser output.
- As a low cost solution for on-line gas quality measurement, GasPTi can be employed widely across gas transmission, distribution networks and end-user applications with a resulting improvement in overall network monitoring, control and energy accounting.



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Thank You !

Any Questions ?



*See us on Stand 16 in the Exhibition*

