PROMECON
we focus on your process

Operational cost reduction through special technology of air and gas flow measurement with McON IR

To measure is to know !

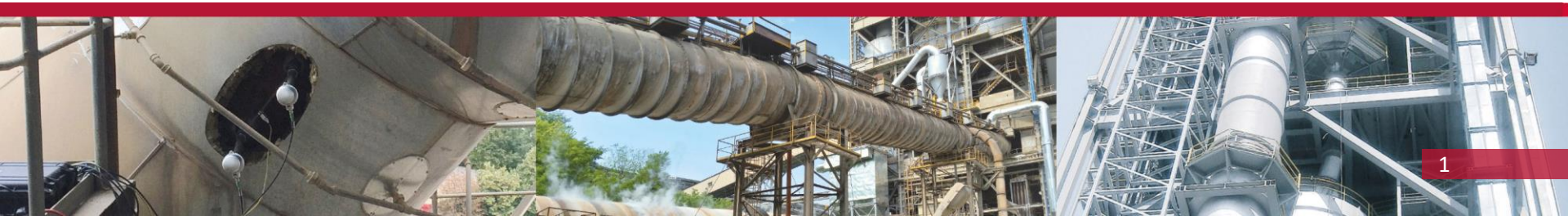
E007 20211006

PROMECON´s main products

- Correlation based gas velocity measurement
- Microwave based pneumatic solids transport measurement
- Microwave based unburned carbon measurement
- Stack emission measurement

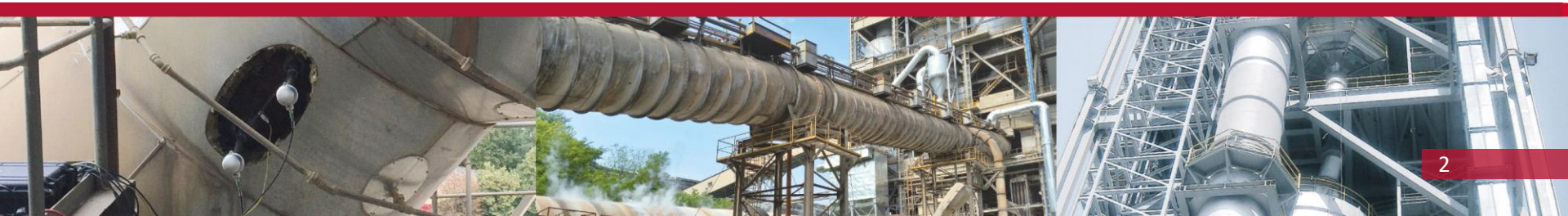
Our main focus is on digital measurement in the process

We focus on process optimisation



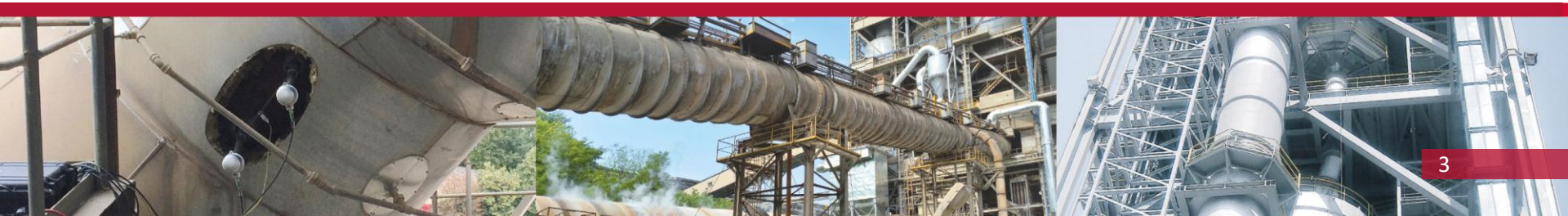
PROMECON´s main clients worldwide

Green: Power Stations, Red: Steel Plants, Grey: Cement Plants



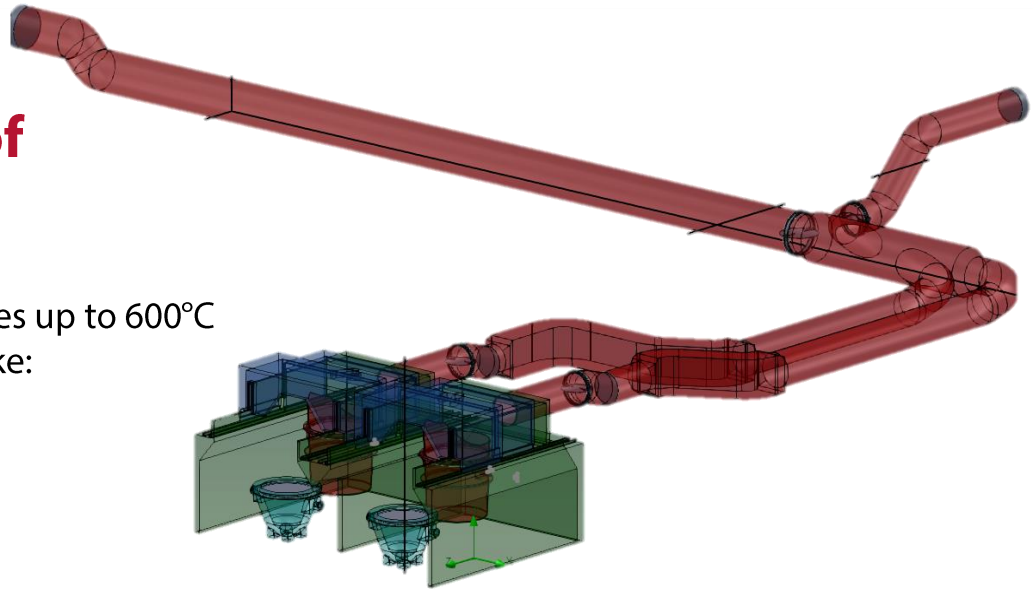
Industries served by PROMECON

- Power Generation
- Waste to Energy
- Steel Plants (BOF/Sintering/Dedusting/EAF)
- Cement Making
- Limestone plants
- Lead refineries
- Zinc refineries
- Copper Smelters
- Glas industry



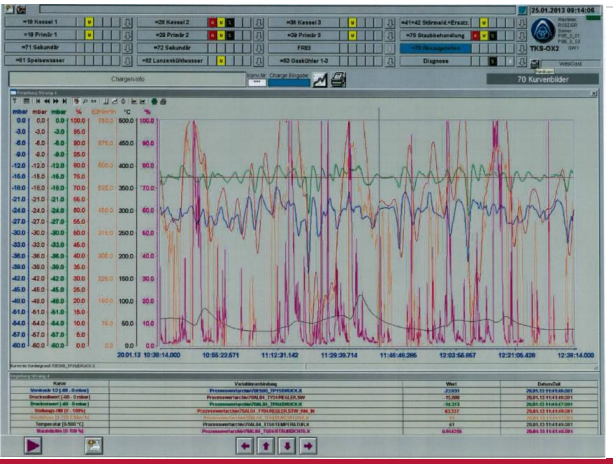
McON Air in steel

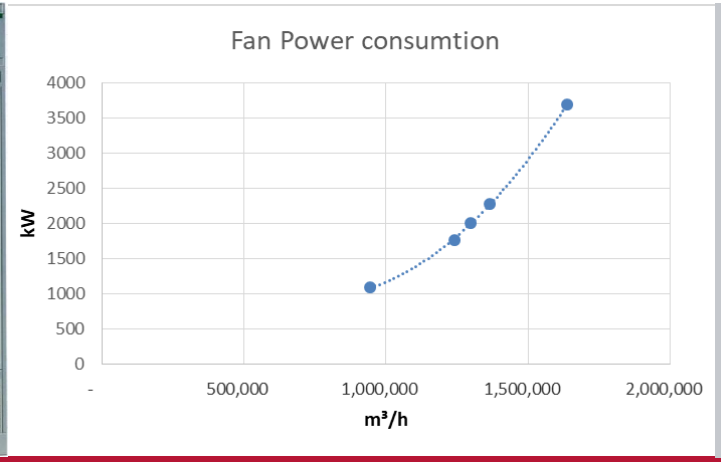
Measurement and Control of Dedusting Sites

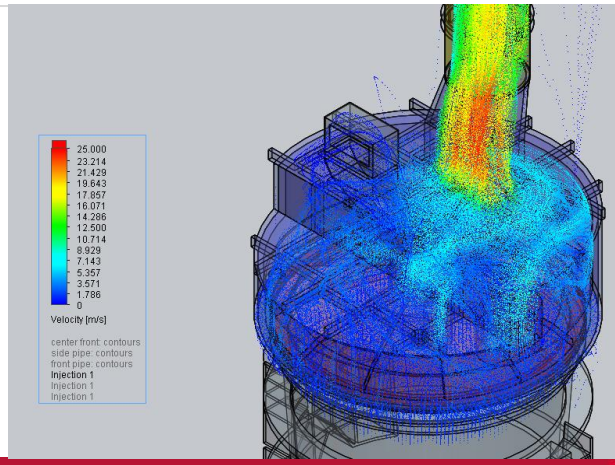


With conventional sensors for of dust laden Gases up to 600°C to control fans and damper of dedusting sites like:

- Slag skimming Station
- Desulphurisation Stations
- Ladl-Metallurgy Stations
- Facility-dedusting

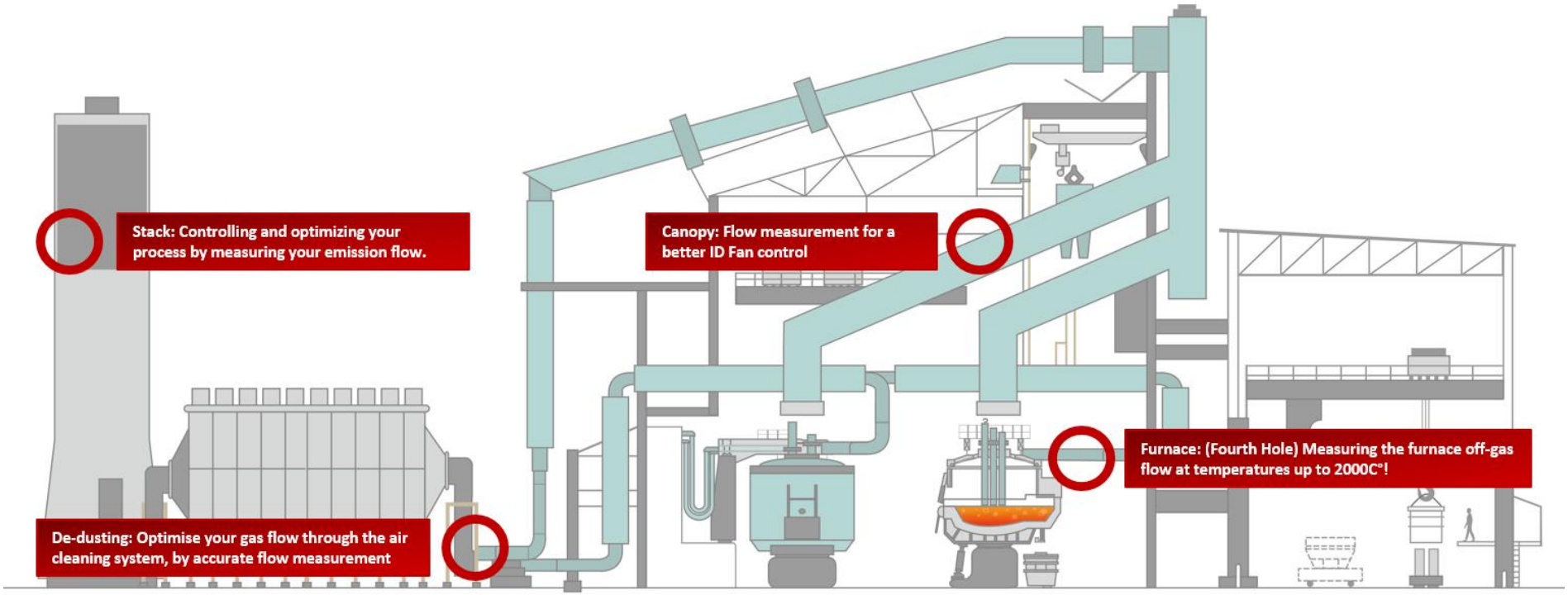




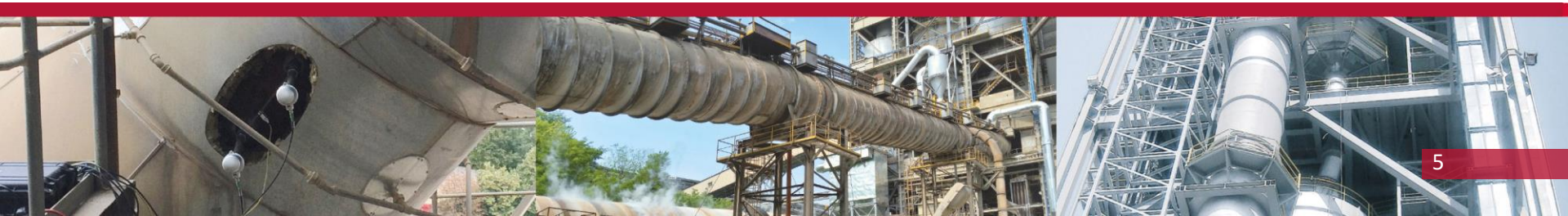


McON Air and McON IR

Steel Applications



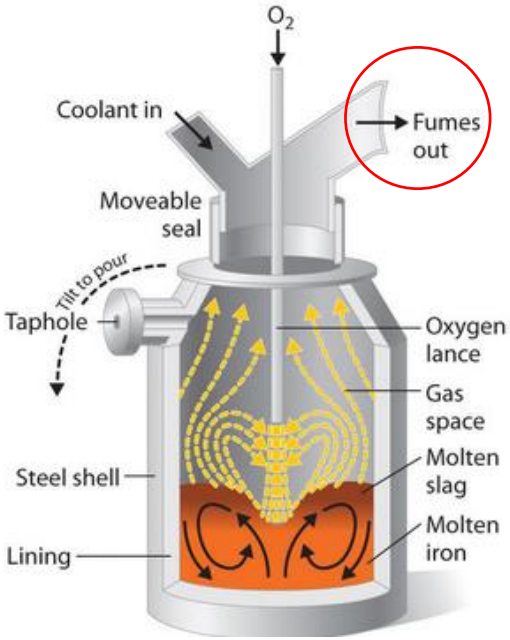
McON Air IR – NEW digital gas velocity measurement for modern steel plants

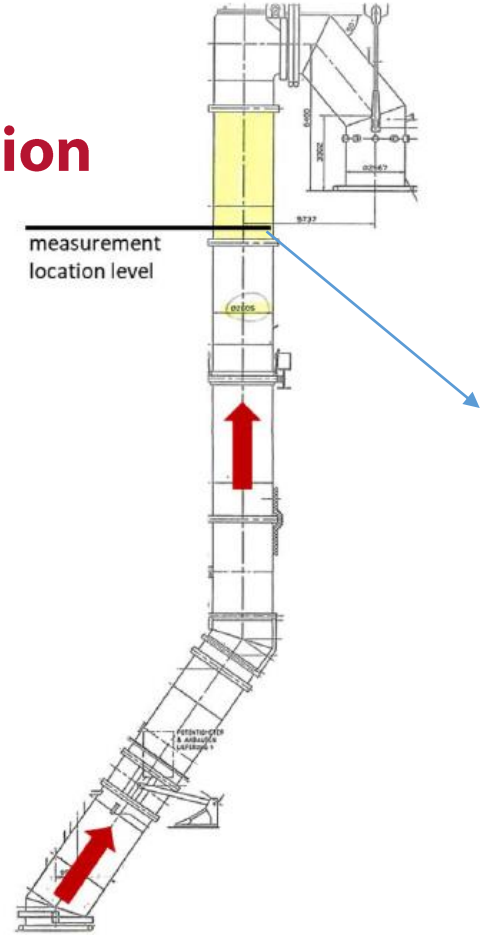


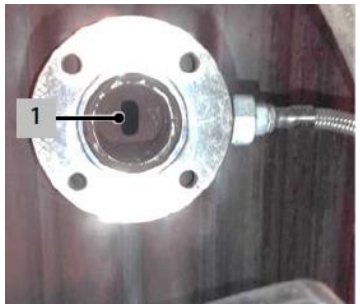
McON IR

Blast Oxygen furnace application

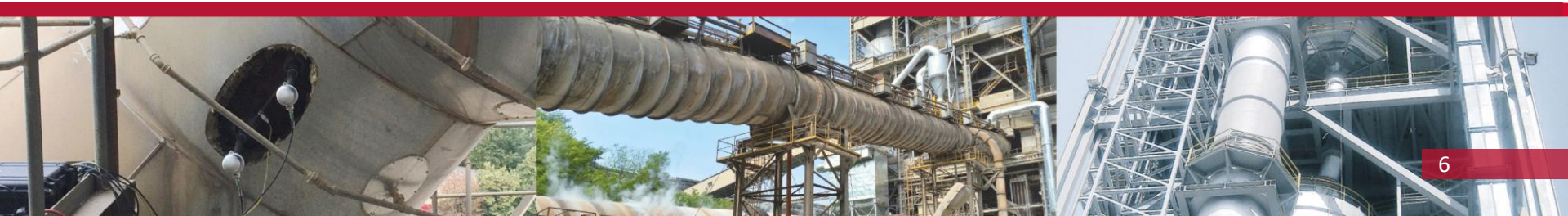
Voestalpine Steel
Austria







1 Opening in water cooled wall: 12x25mm



McON Air IR

Technical features

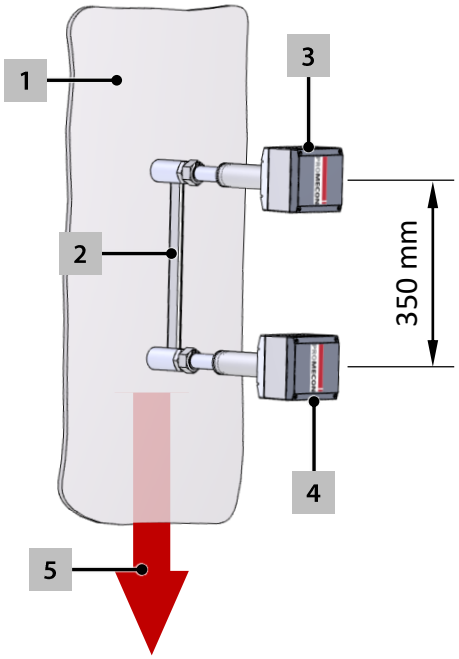


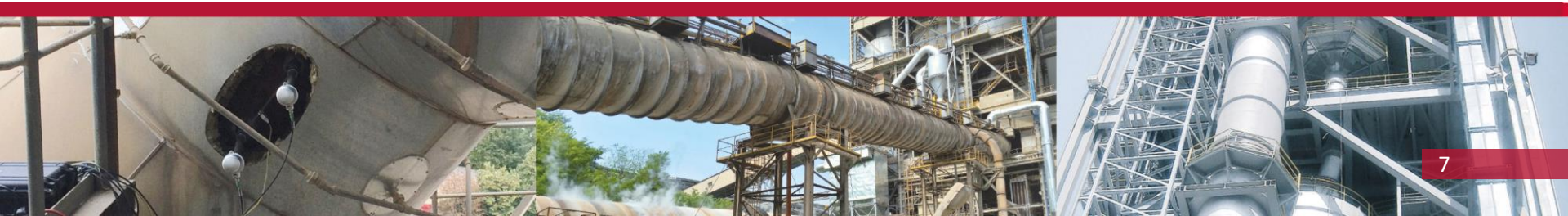
Fig 5: [1]- duct wall, [2]- weld-on mounting adaptor, [3]- sensor 1, [4]- sensor 2, [5]- flow direction

IP 66 protected sensors, with pre aligned mounting adaptors.

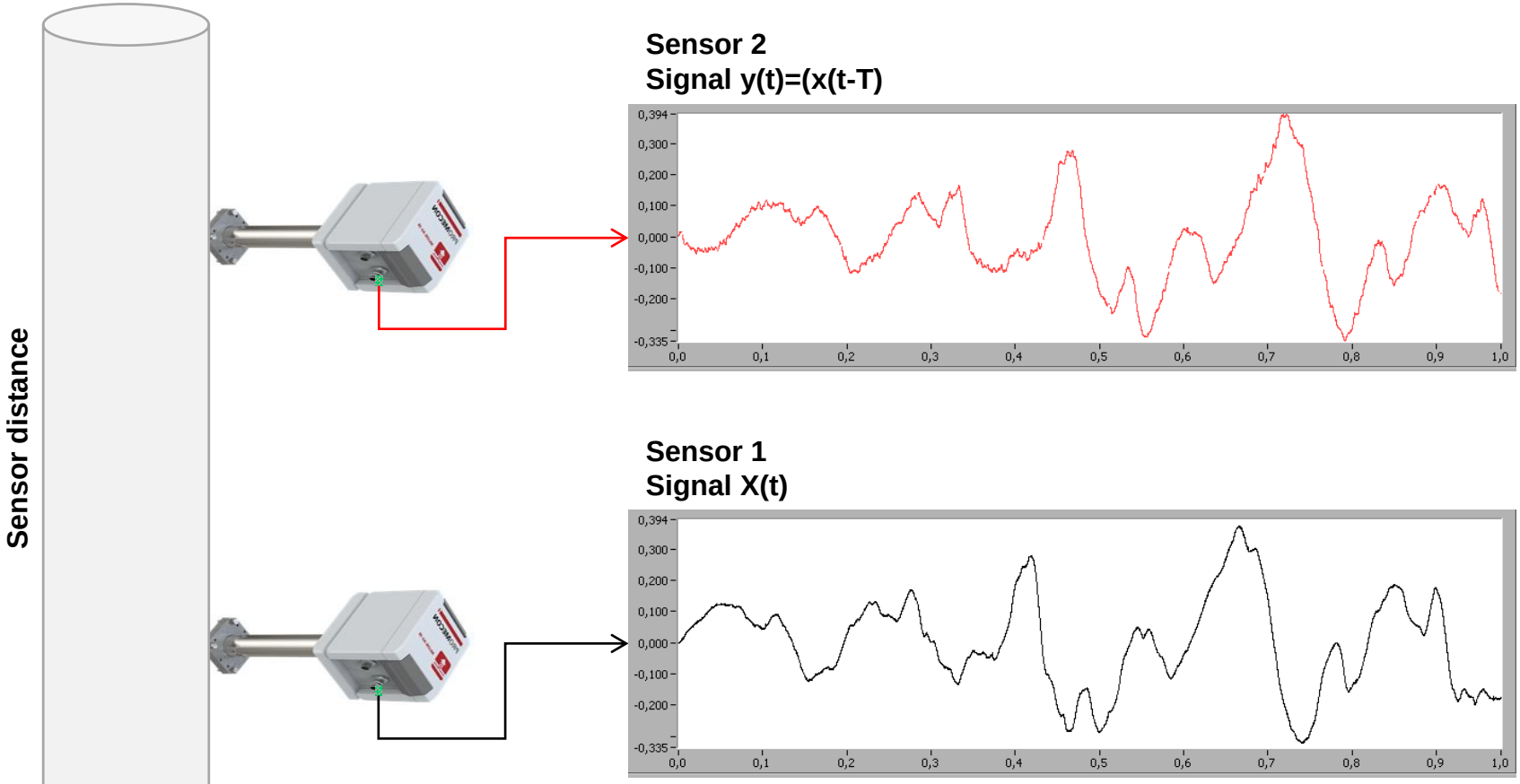
Purge air /nitrogen connections on housing and adaptors.

Air quality is managed by included filter and conditioning Unit (4 bar min) 30 l/min

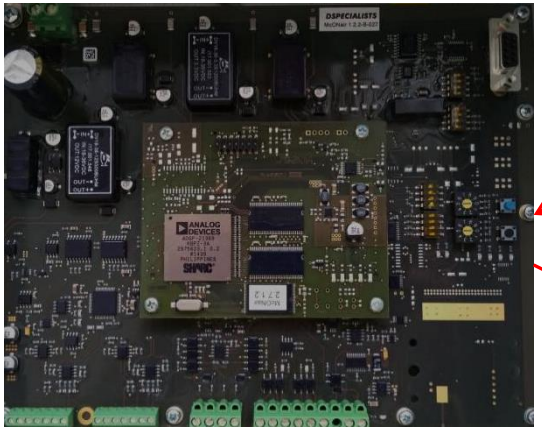
Sensors are non-intrusive



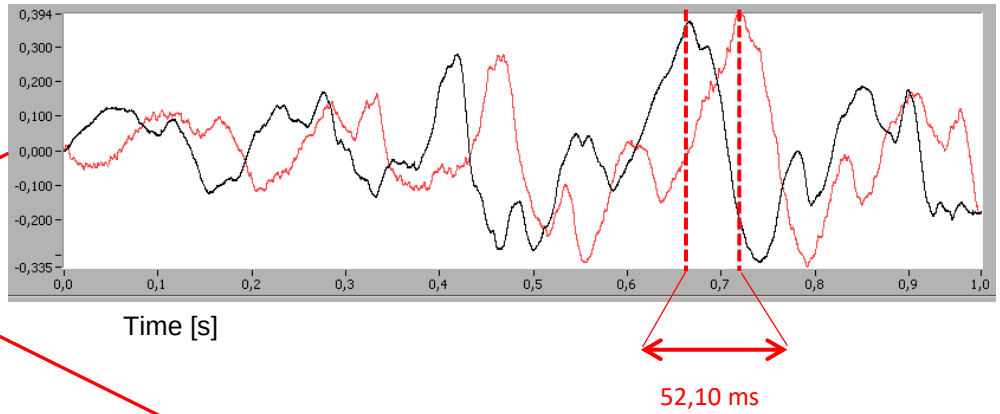
Measurement Principle – RAW Signals



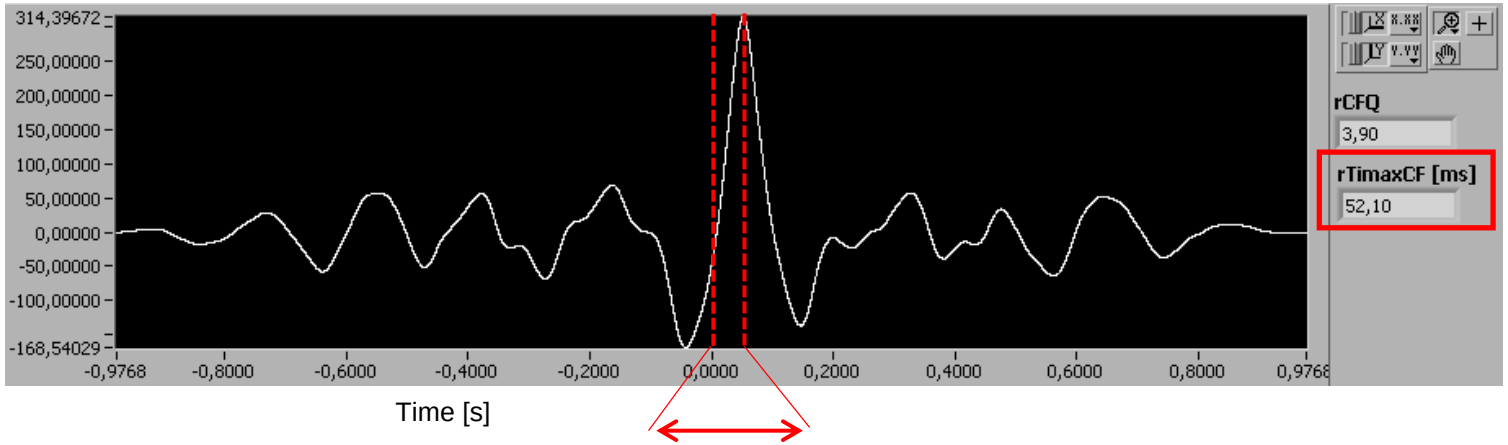
Measurement Principle – RAW Signals



Sensorsignals



Correlation Function



McON IR

System description - functionality

The optical measurement method has the following characteristics:

- Linear measurement along the sensor alignment axis
- Average measurement of the flow profile in the range of a line between approx. 0.3 x DN and 0.7 x DN (from the sensor)
- Since the (time-based) measurement is drift-free, there is no need to calibrate it
- Measuring ranges
  - Velocities : from 3 m/s up to more than 100 m/s
- Measuring conditions
  - Temperature : currently between 100°C and 2 500°C
  - The process gas must have a total concentration of at least > 5% by volume of CO_2 and CO, combined or alone or any other suitable molecule.
  - Purge air requirement (depending on the process : either compressed air or nitrogen)

A minimum wall opening of 12 mm in diameter is required for the sensors to be aligned. The full sensitivity of the sensor is achieved above 20 mm diameter.

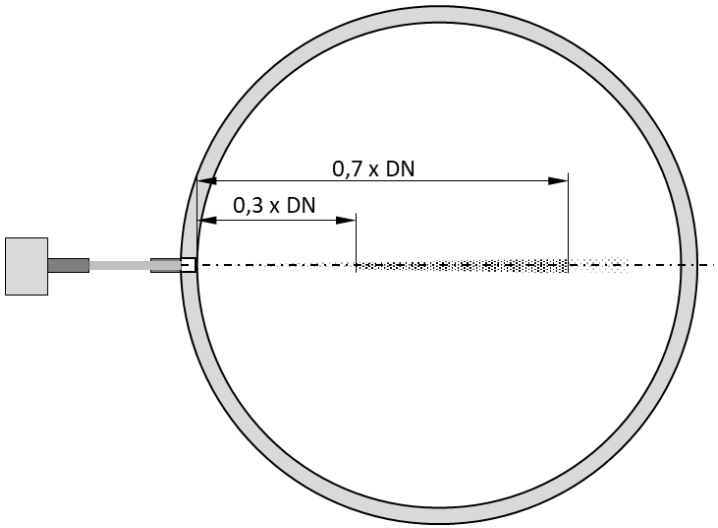
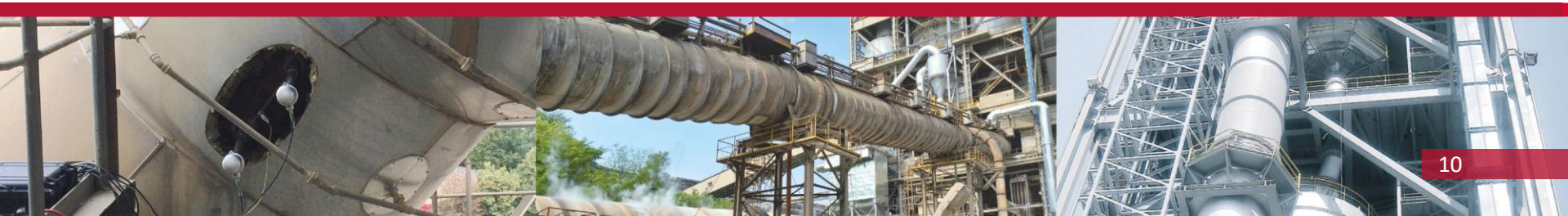


Fig. 1: [1]- sensor, [2]- duct wall, [3]- sensor alignment axis, [4]- sensor measuring range

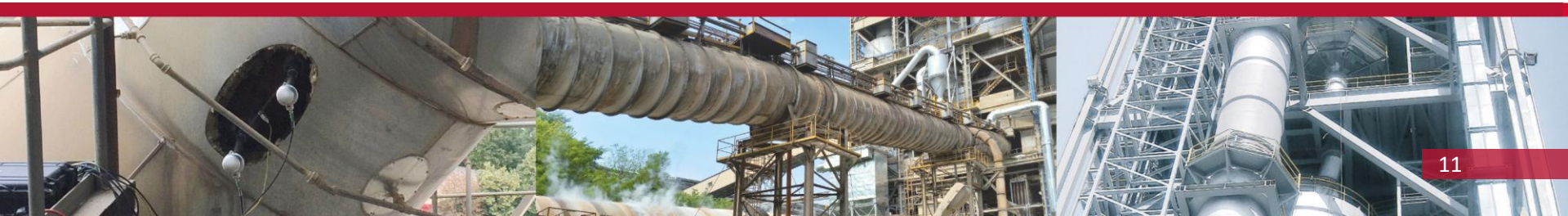


McON IR velocity

System description - functionality

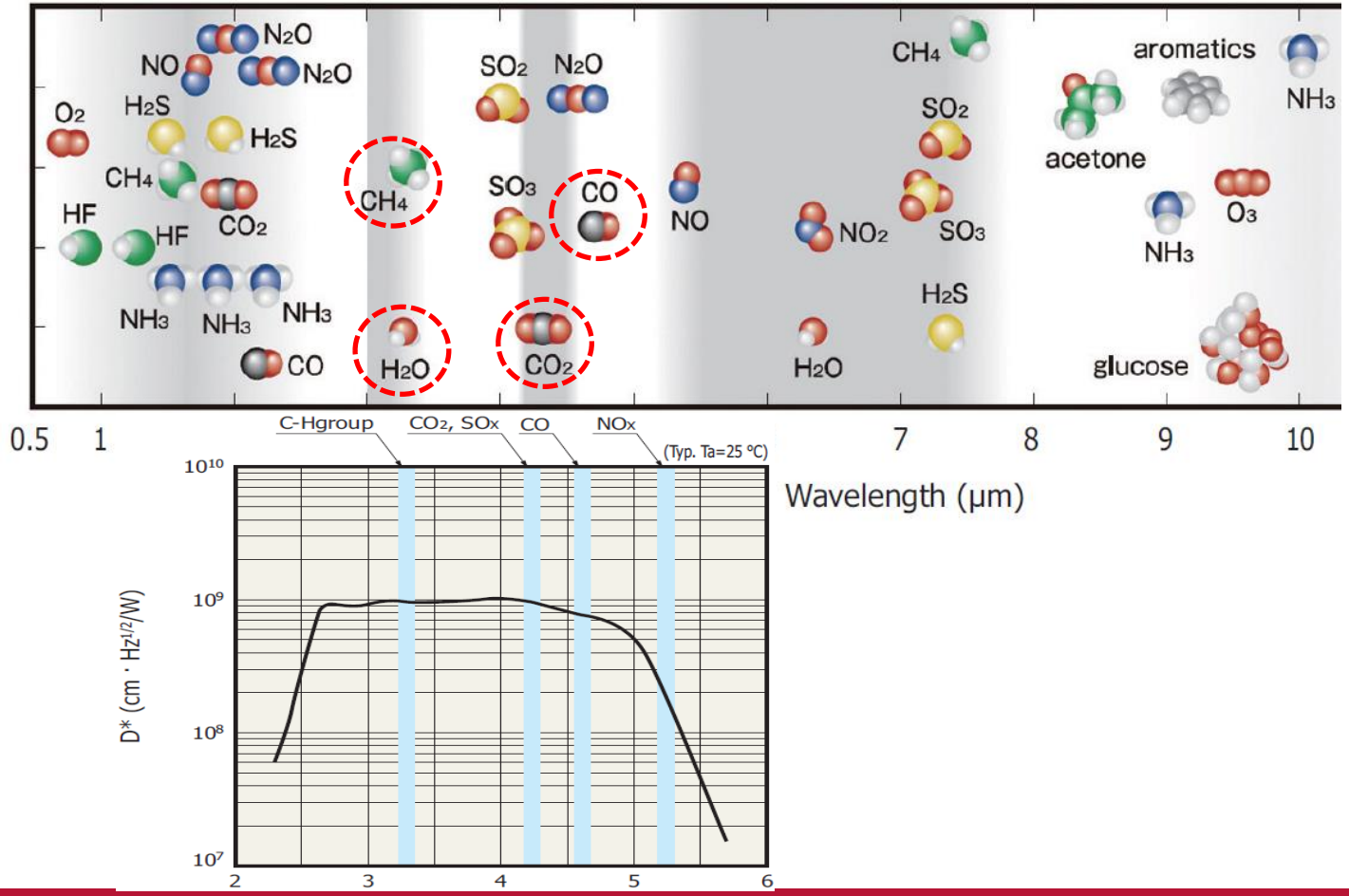
Technical data: IR sensor and measuring system

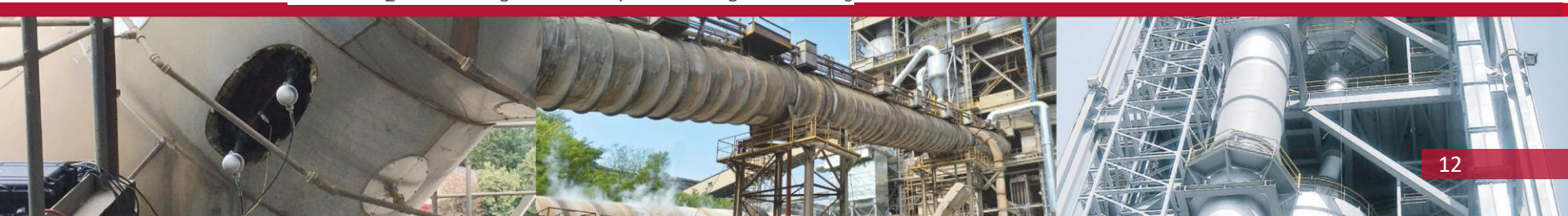
Parameter	Value
Measuring range	3 …100 m/s
Characteristic accuracy	+/- 2%
Repeatability	greater than 99,95%
Linearity	100%
Drift	none
Hysteresis	none
Sensitivity to spinning	none
Sensitivity to process pressure	none
Sensitivity to process temperature	none
Sensitivity to dust	none
Calibration	not necessary
Process temperatures	100 … 2.500 ºC
Sensor housing protection	IP66
Ambient temperatures	max. 50 ºC
Purge air or nitrogen	3.000 hPa min. for 100 l/min
Air quality	according to ISO8573-1:2010 [1:4:2]
Concentration of CO and CO_2 or any other appropriate molecule contained in the gas	> 5% by volume, combined or alone
Sensor insertion length	0 mm



McON IR

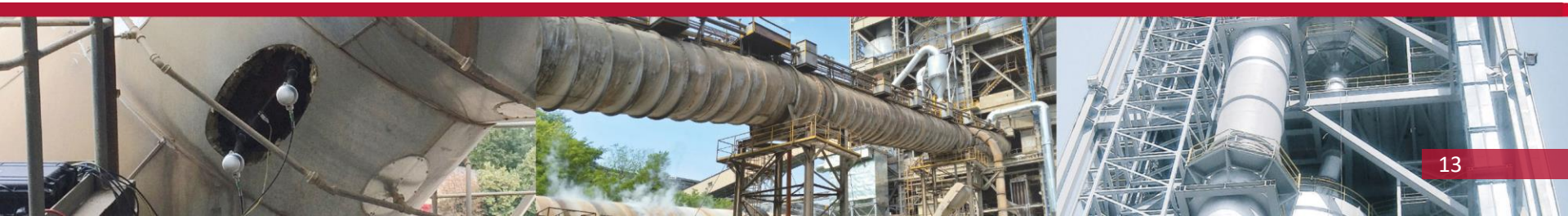
- IR absorption of specific molecules





Measurement Parameters

- Velocity
- Temperature
- Enthalpy
- CO_2
- CO
- H_2O
- NO_x
- CH_4



Measurements around the EAF - Offgas

McON IR Central Unit
601010 0002

McON IR Velocity
609010 0006

McON IR CO2/CO
609010 0007

McON IR H2O
609010 0008

McON IR TEMP
609010 0009

Pulsed Purge Air / Nitrogen

Continuous Purge Air / Nitrogen

McON IR Field Box
601020 0001

Nitrogen Supply from Customer

1“ AG
350 Nl/min
min. 6 bar

Sensor Cables

Sensor Cable and Hose Set 5m
609010 0011
Cables and purge air hoses are protected by stainless steel hose

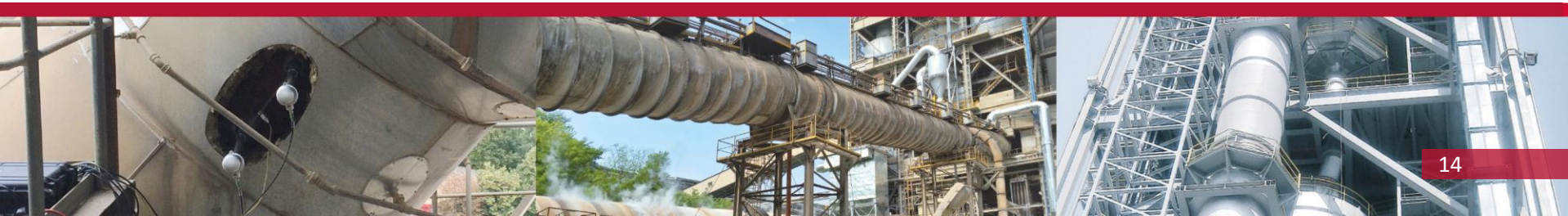
Sensor Signals (2x 18,5 mm AD),
Power Supply 24V (8 mm AD)
Ethernet Cable
Total Bending Radius 140 mm!

Central Connection Cable 40 m
609010 0013

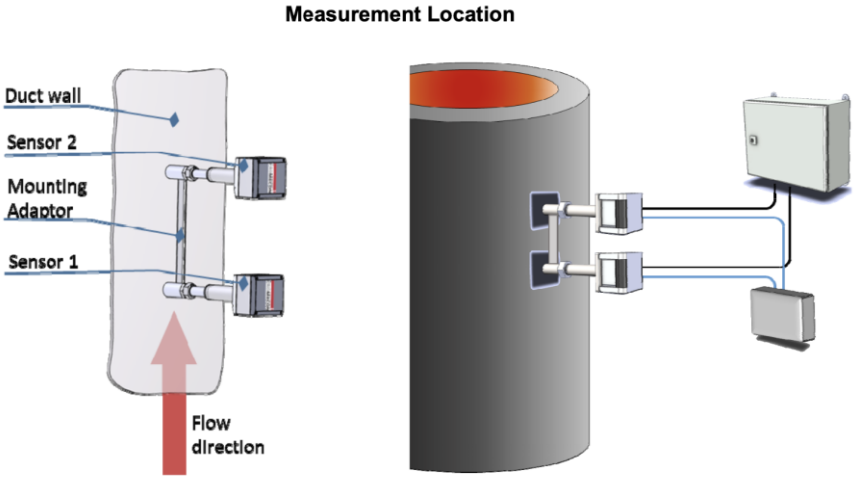
Modbus to Customer (opt. Profinet)

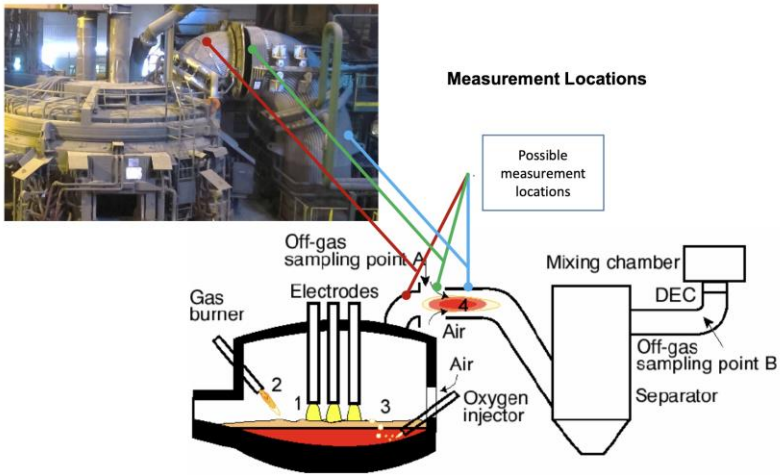
Power Supply 230V 10A AC from Customer

Length specifications refer to cable lengths



Measurements around the EAF - Offgas





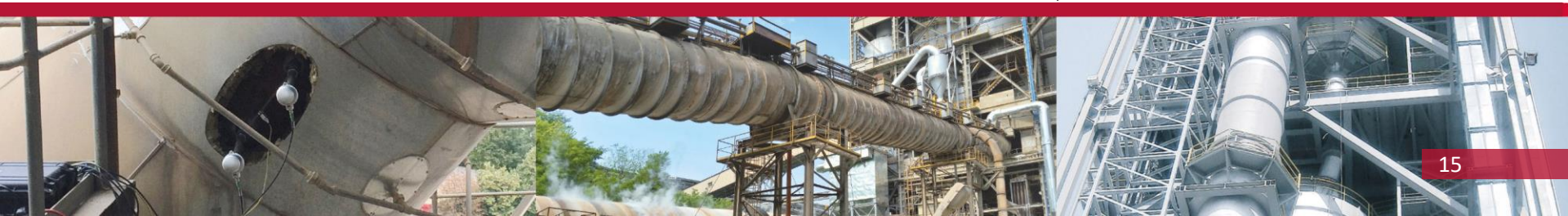
Measured Values: CO, CO_2, off-gas velocity, (H_2O and the off-gas temperature)

Response time: < 2 seconds

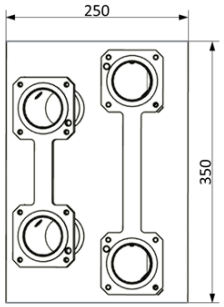
Virtually maintenance free: < 15 min/week

Goal:

- Increased safety
- Process optimization with dynamic process control
- Less expensive in CAPEX and OPEX compared to the Laser-Analyzer

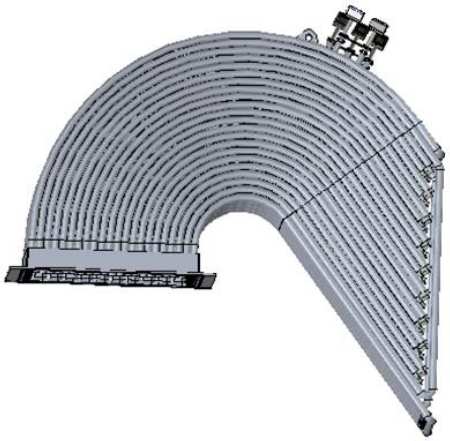


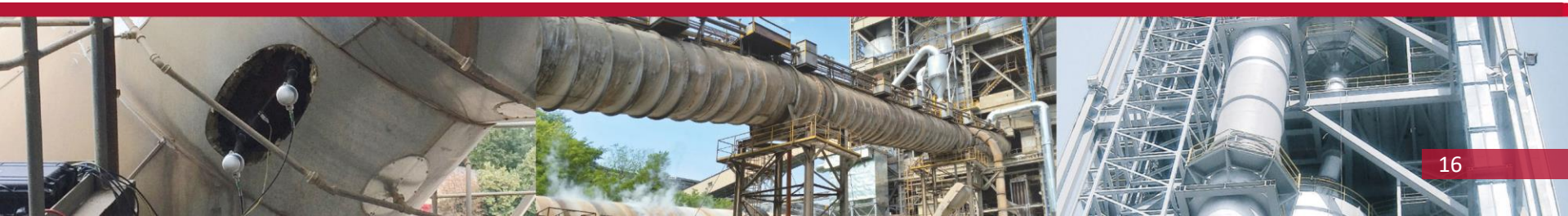
Measurements around the EAF - Offgas



Measurement location

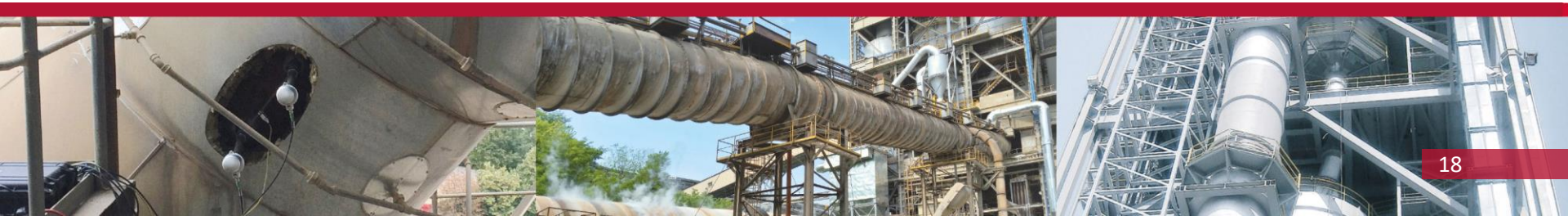
- Simple integration into the duct wall
- Small cut-out, approx. 250 x 350 mm^2 to 250 x 500 mm^2
- One-time rough alignment of the sensors necessary
- No components in the duct





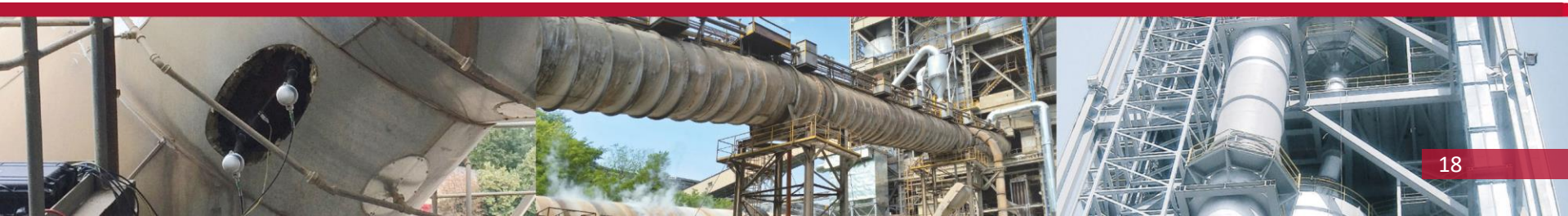
Comparison to alternative Laser measurements

Laser Based Measurement – only small part of cross section

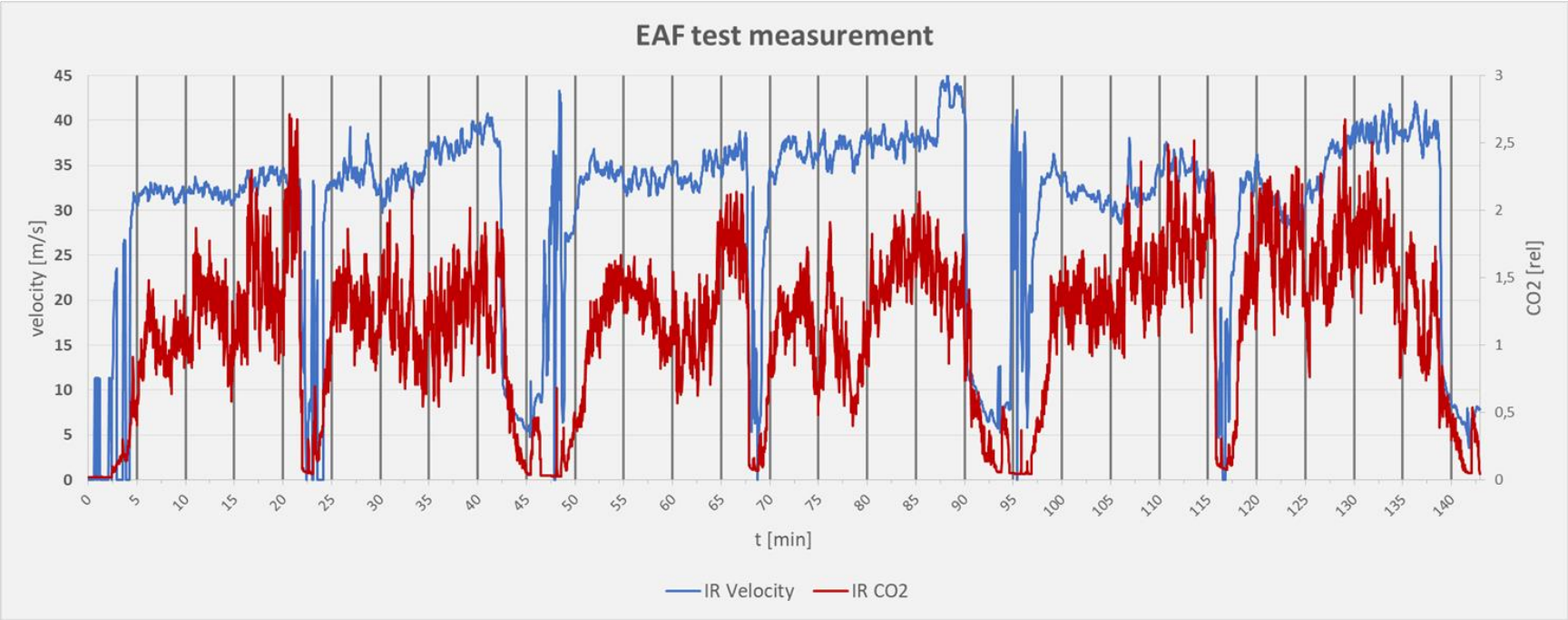


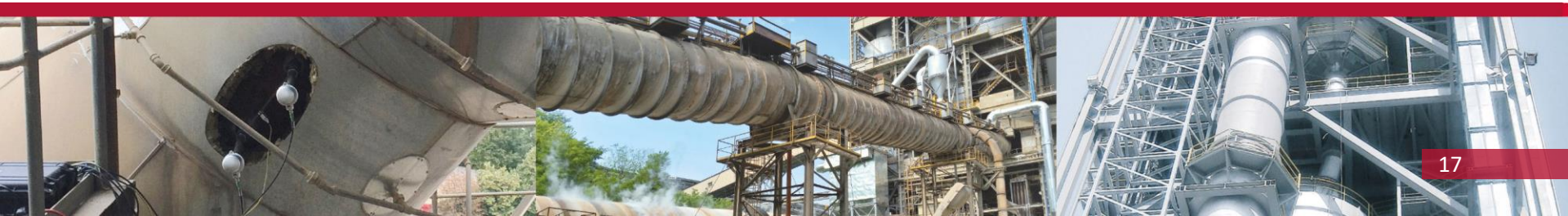
Comparison to extractive measurements

Laser Based Measurement – only small part of cross section



Measurements around the EAF - Offgas

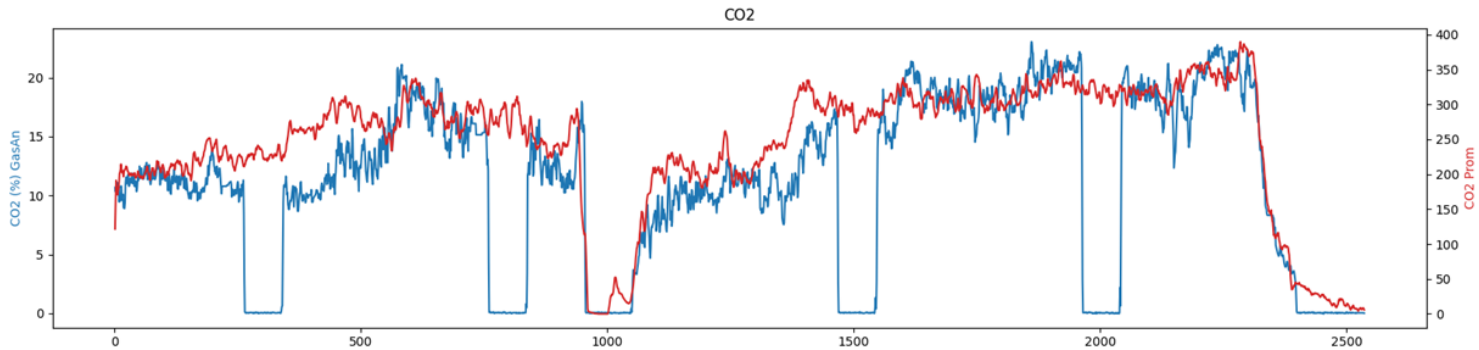




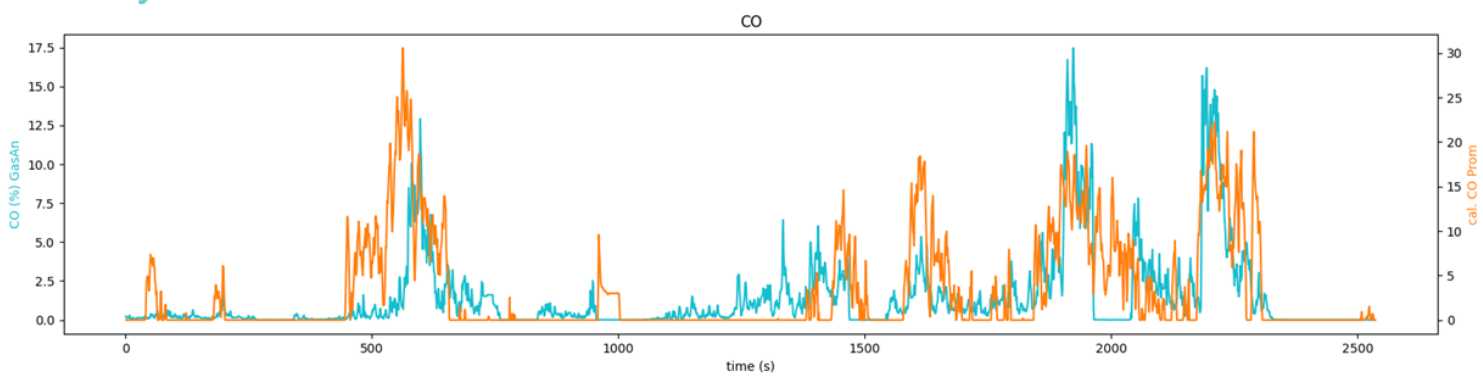
Measurements around the EAF - Offgas

Example Measurement of CO and CO_2 on EAF outlet

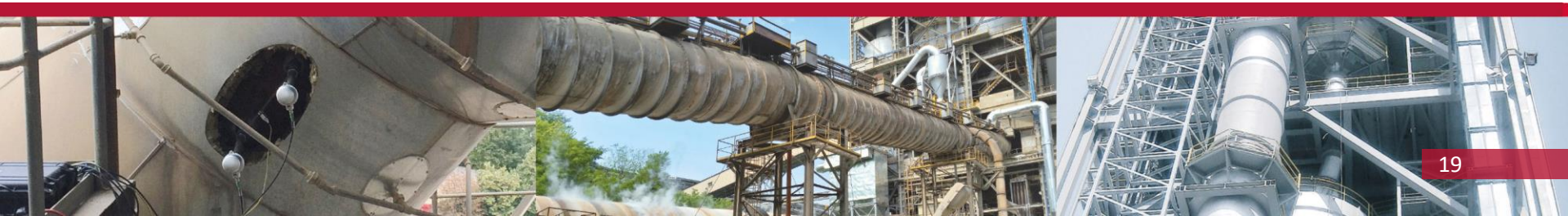
Gas Analyzer **CO_2** McON IR



Gas Analyzer **CO** McON IR

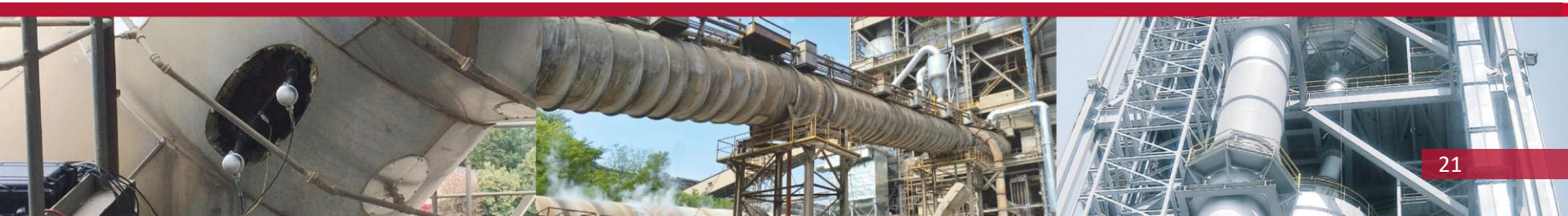


Gas Analyser Data by courtesy of DANIELI



McON IR

Motivation to change Benefits and commercial savings



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we focus on your process

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Dipl.-Ing.

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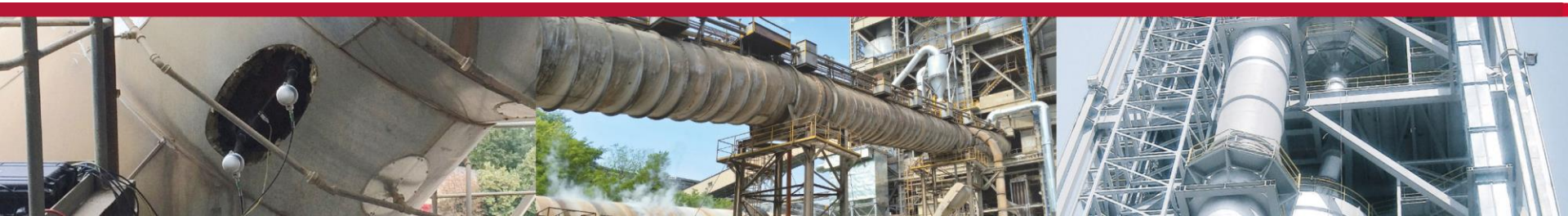
E-Mail: hansgeorg.conrads@promecon.com