

2D TEMPERATURE MEASUREMENT WITH SOUND

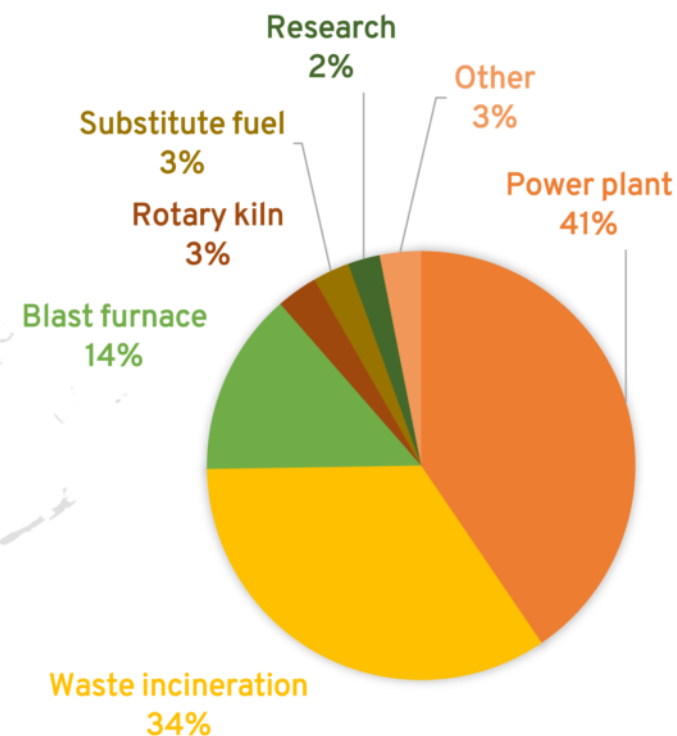
23.09.2025

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5. AOTK – Aachener Ofenbau- und Thermoprozess-Kolloquium

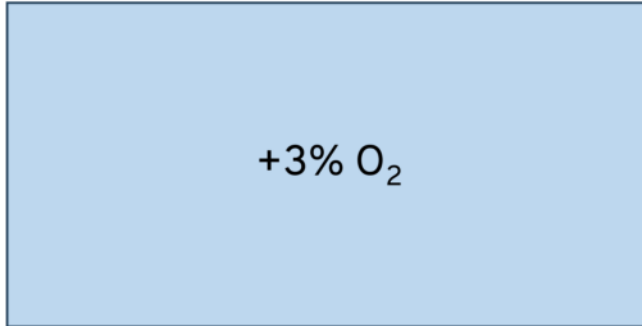


Application areas

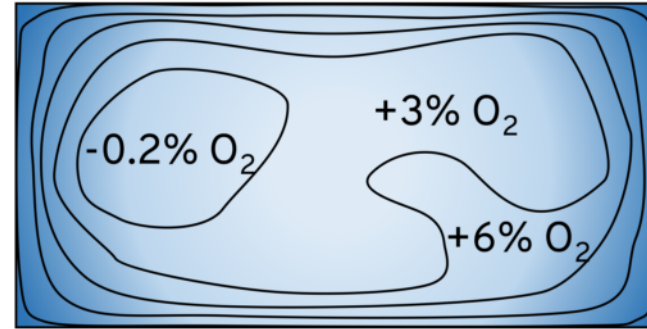


➔ **>350 Applications in 37 countries**

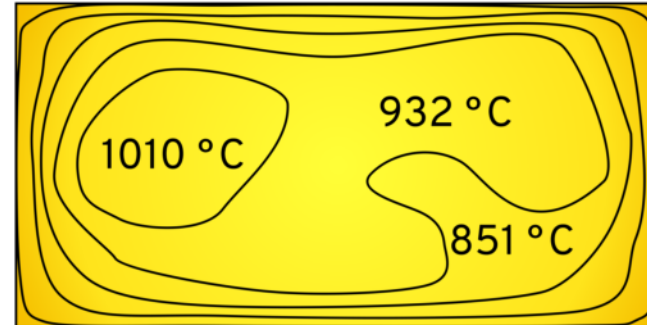
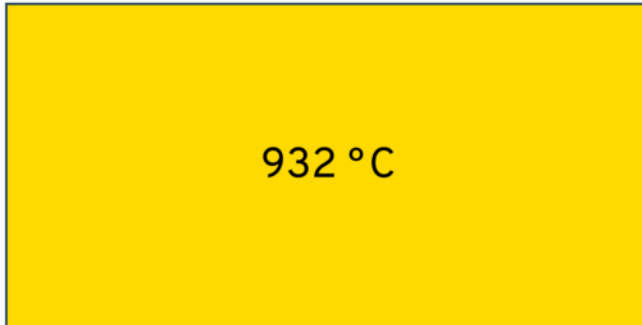
❌ Wrong assumption



✅ Reality



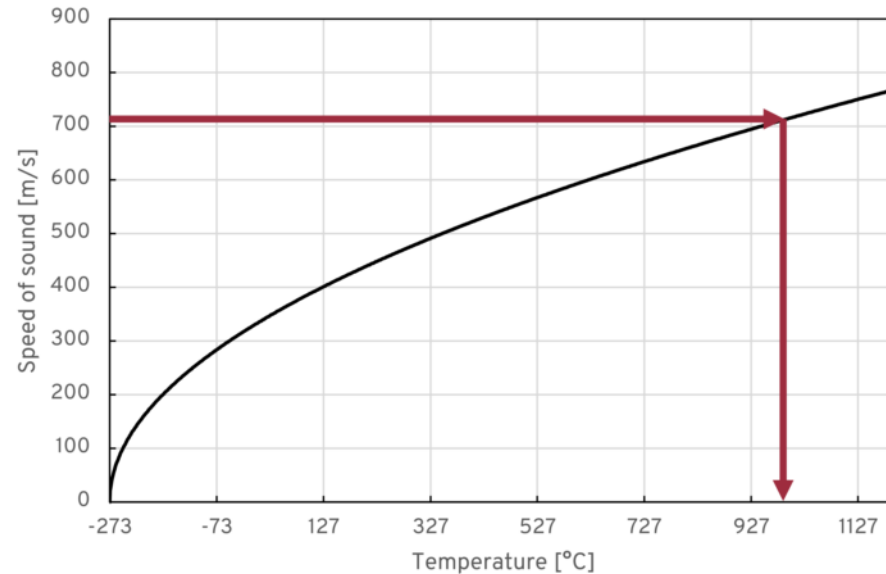
➡ Combustion conditions are not homogenous



➡ Live 2D temperature distribution to understand local combustion

$$c = \sqrt{RT \frac{\kappa}{M}}$$

c speed of sound
 R molar gas constant
 T gas temperature
 κ adiabatic index
 M molar mass



➡ True gas temperature

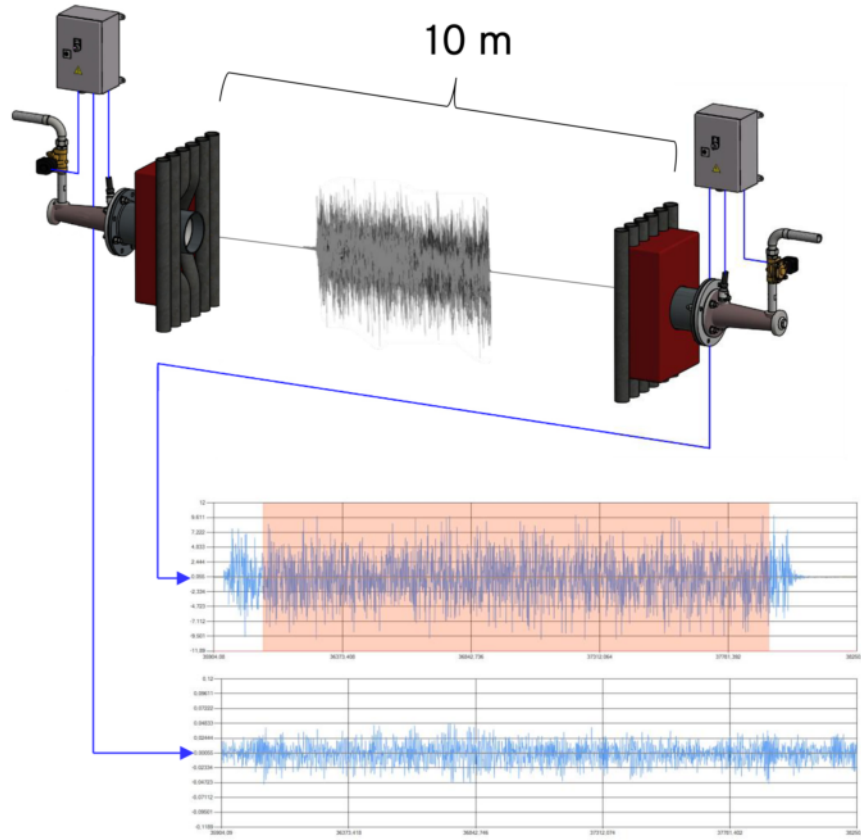
Free of:

- Radiation
- Calibration parameters
- Drift

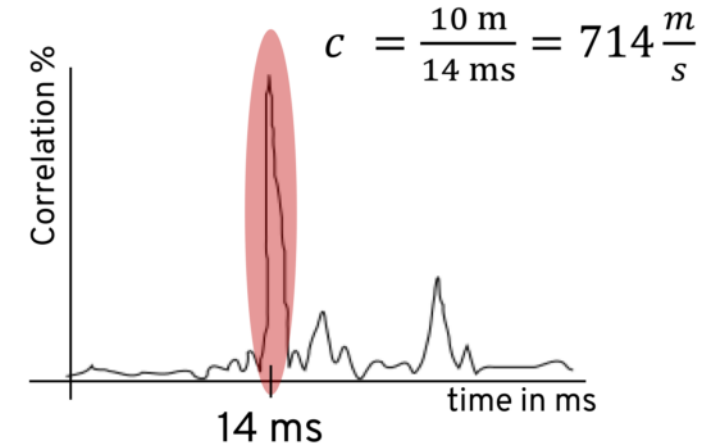
Dependency:

- Composition of flue gas
 ➡ Resulting in max. ± 1.0%

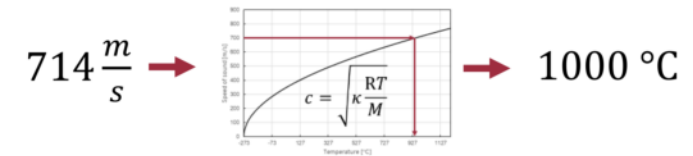
1) Record

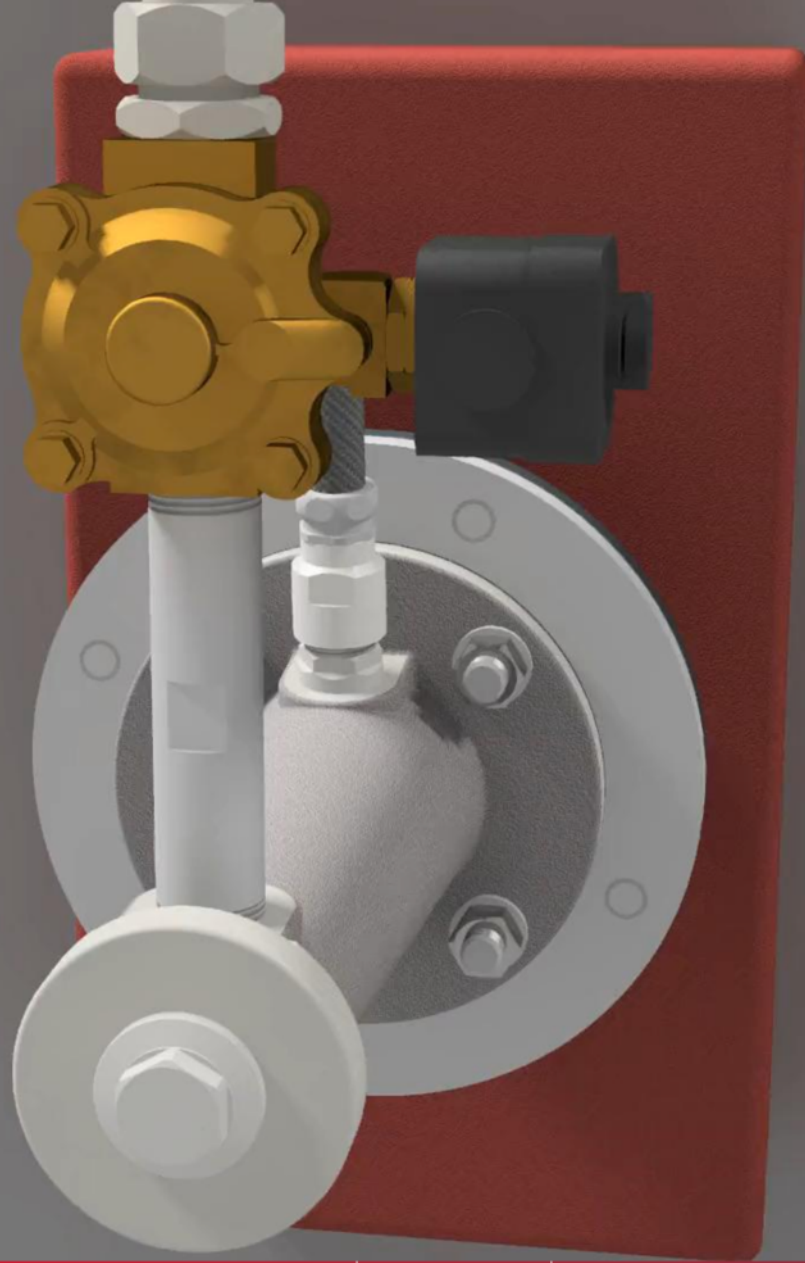


2) Evaluate

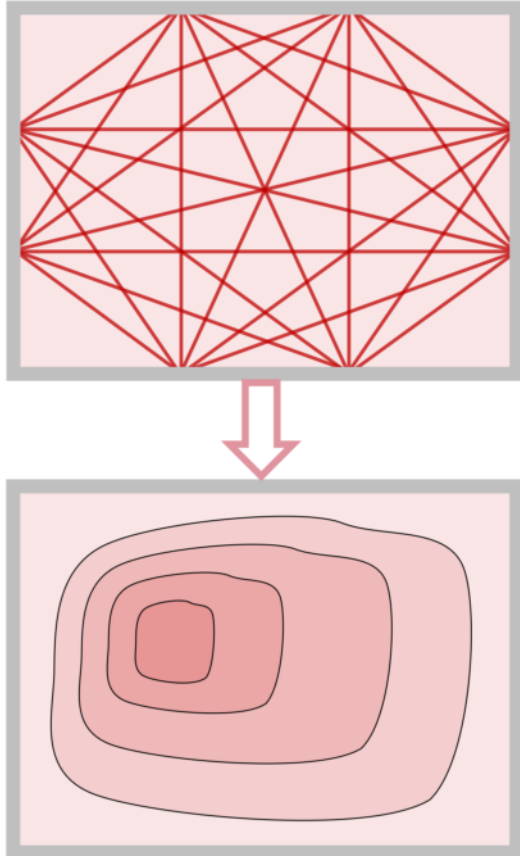


3) Calculate

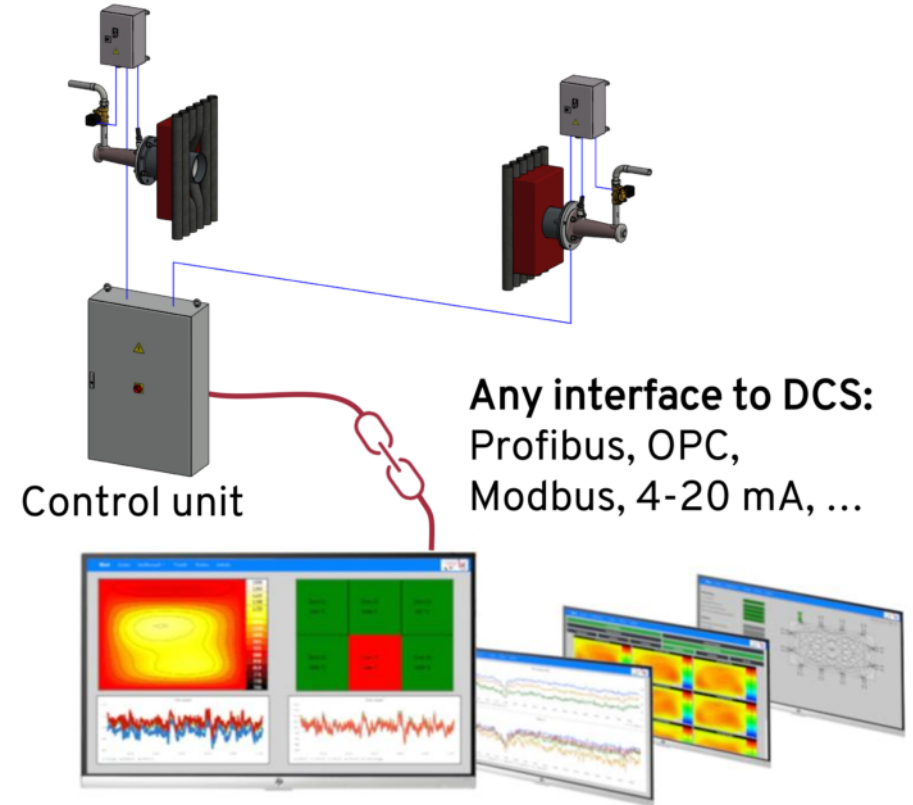




4) Tomography

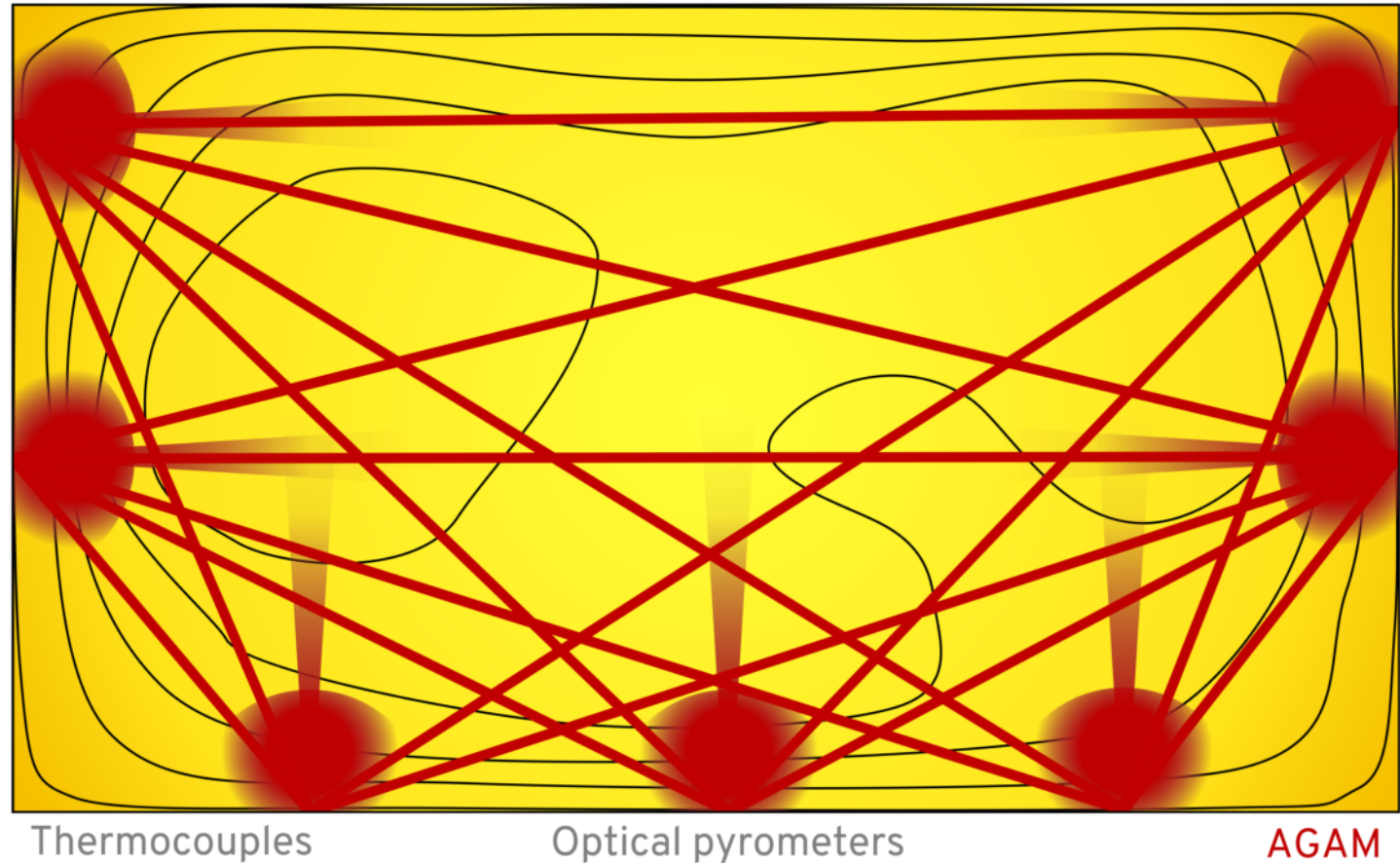


5) Integration & Visualization

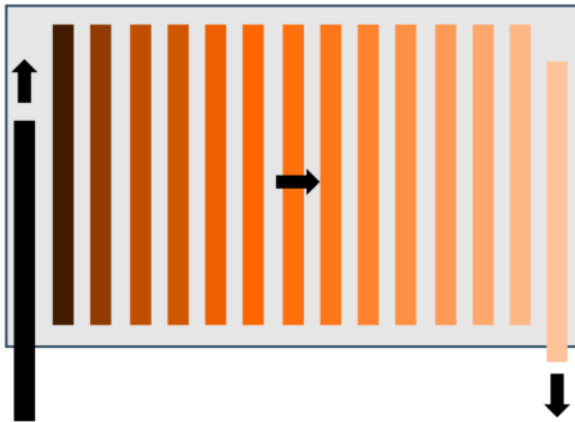


<https://agamdemo.budi.de/>

- Independent of radiation
- Fast measurement
- Free of drift
(no calibration)
- Robustness
(no maintenance)
- Geometrical precision &
high resolution



- Heating of steel slabs for further processing



- Control of even heating with AGAM
- Harsh environment
- Gas temperatures: 500 ... 1.000 °C

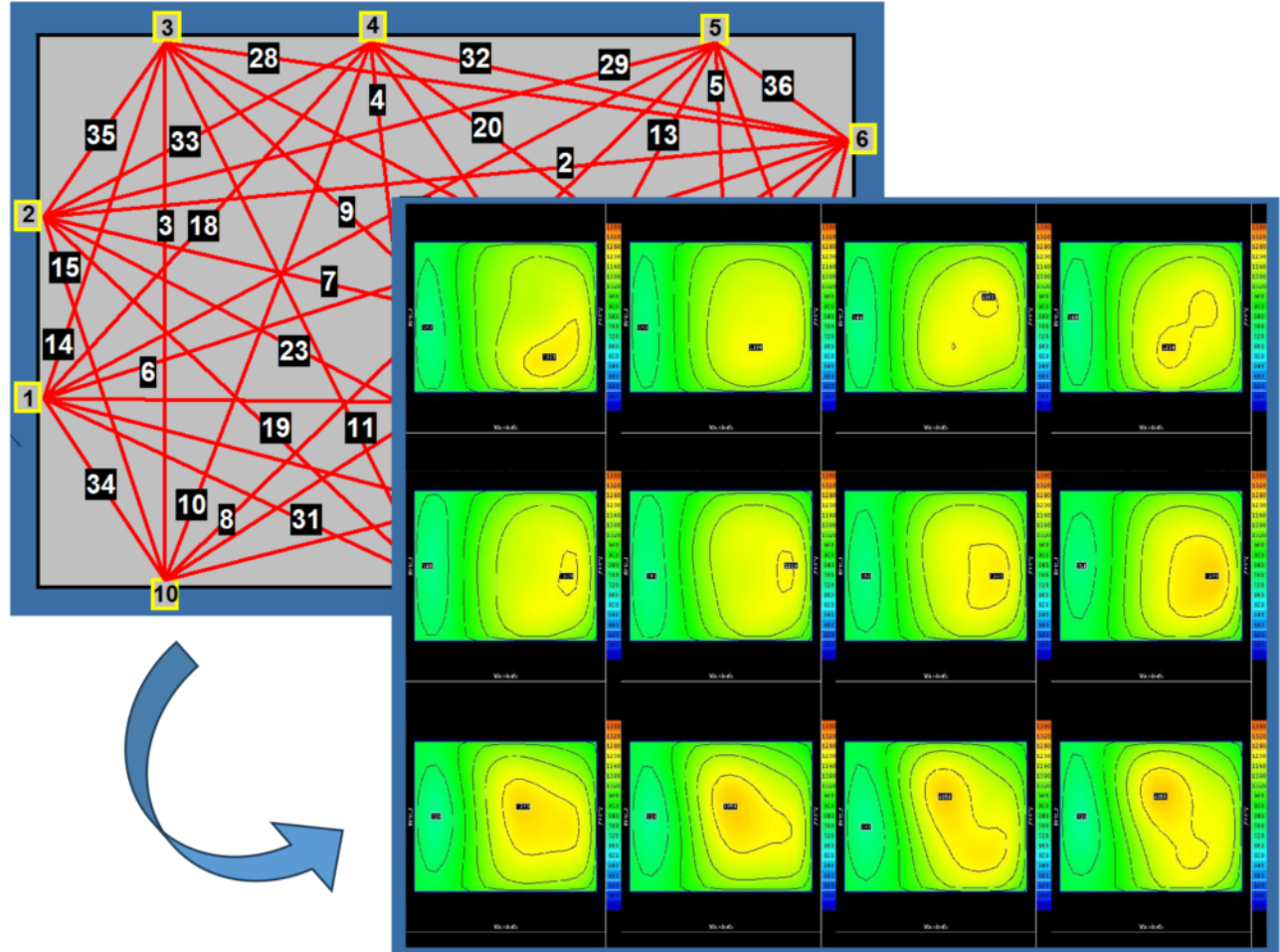


Configuration dependencies:

- Size of the furnace
- Required resolution
- Accessibility of oven
- ... and experience

Calculation of:

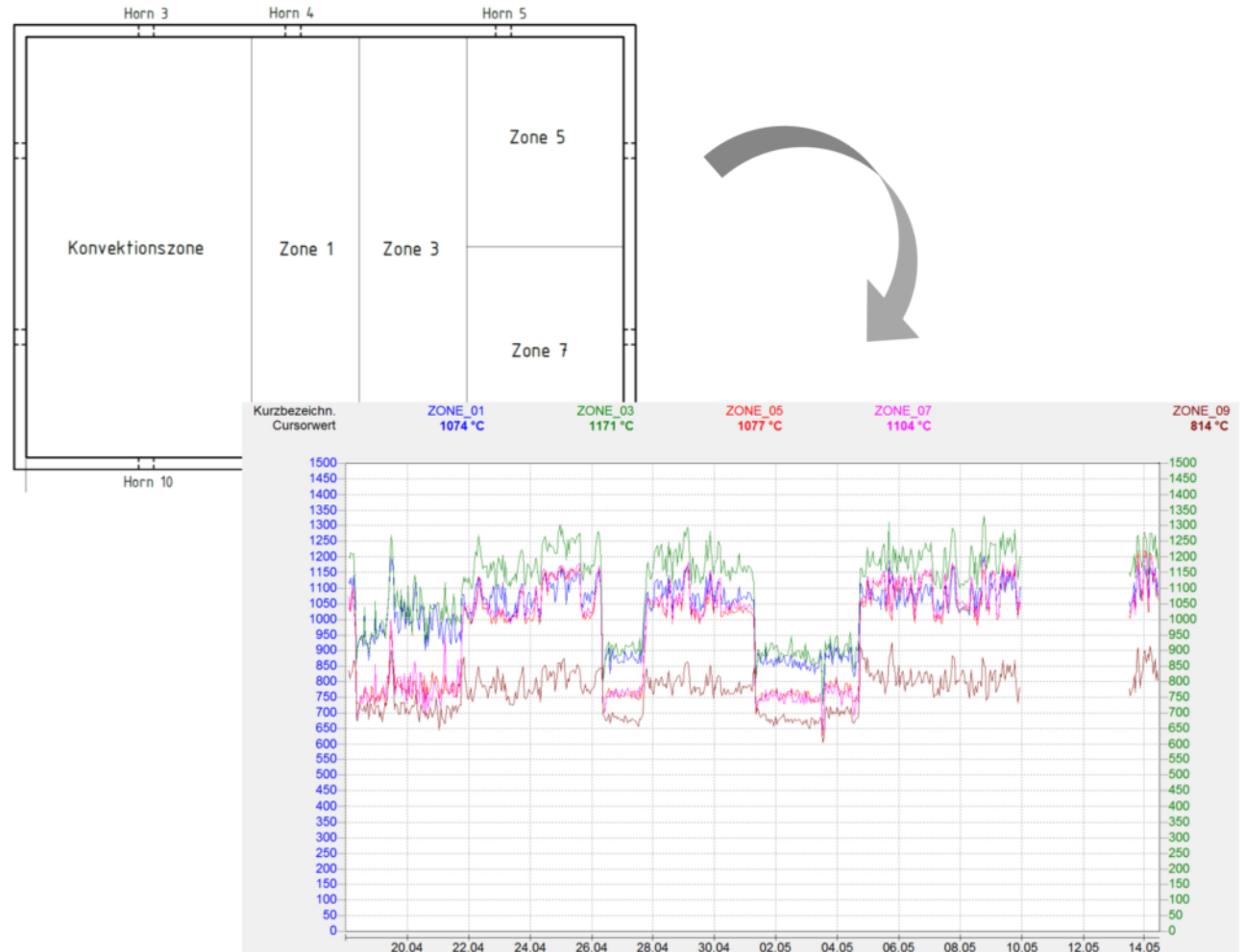
- Live Isothermal view
- Average temperatures
- and ...



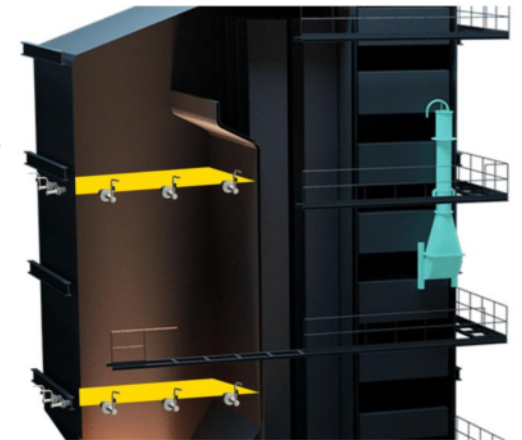
- Zone configuration to customer needs
- Multiple zone configuration possible
- Overlapping zones possible

➔ Local temperature comparison

➔ Automatic burner control



- Furnace size: typically 2 to 30 meters
- Temperature range: 0 – 2000 °C
- Temperatures can be measured with:
 - 2 transceivers -> 1 path -> 1 value
 - 5+ transceivers in one level -> isothermal view
 - 8+ transceivers different heights: 3D temperature profiles
- High speed:
 - Update time of 1D temperature value: instantaneous
 - Update time of 2D/3D temperature profiles: every 4 seconds
- Adaption to specific application possible: ask us!





vCard

Thank you for your attention!



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BONNENBERG & DRESCHER GMBH

More information:

<https://acoustic-gas-temperature.com/>