

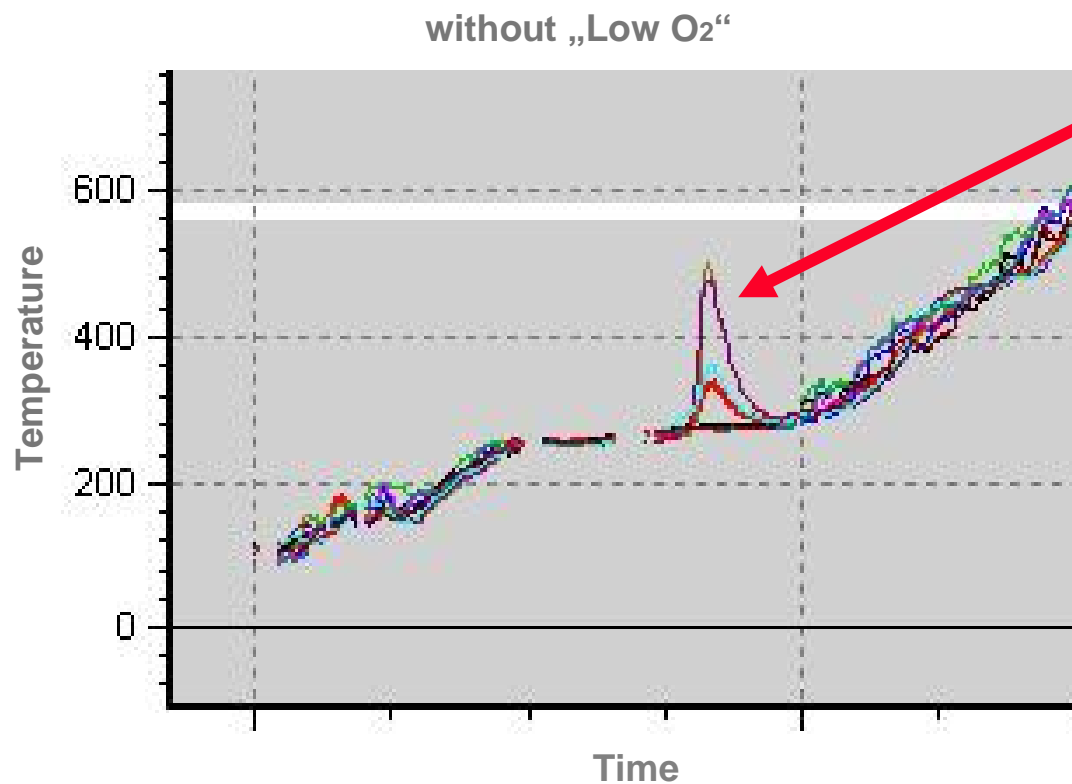
Innovative Heat Treatment of Ceramics Using „Low O₂“ Technology

- Ø Debinding processes
- Ø Discontinuously operated kiln plant with „Low O₂“ technology
- Ø Continuously operated kiln plant with „Low O₂“ technology
- Ø Result
- Ø State of the Technology
- Ø Innovation



Debinding Processes

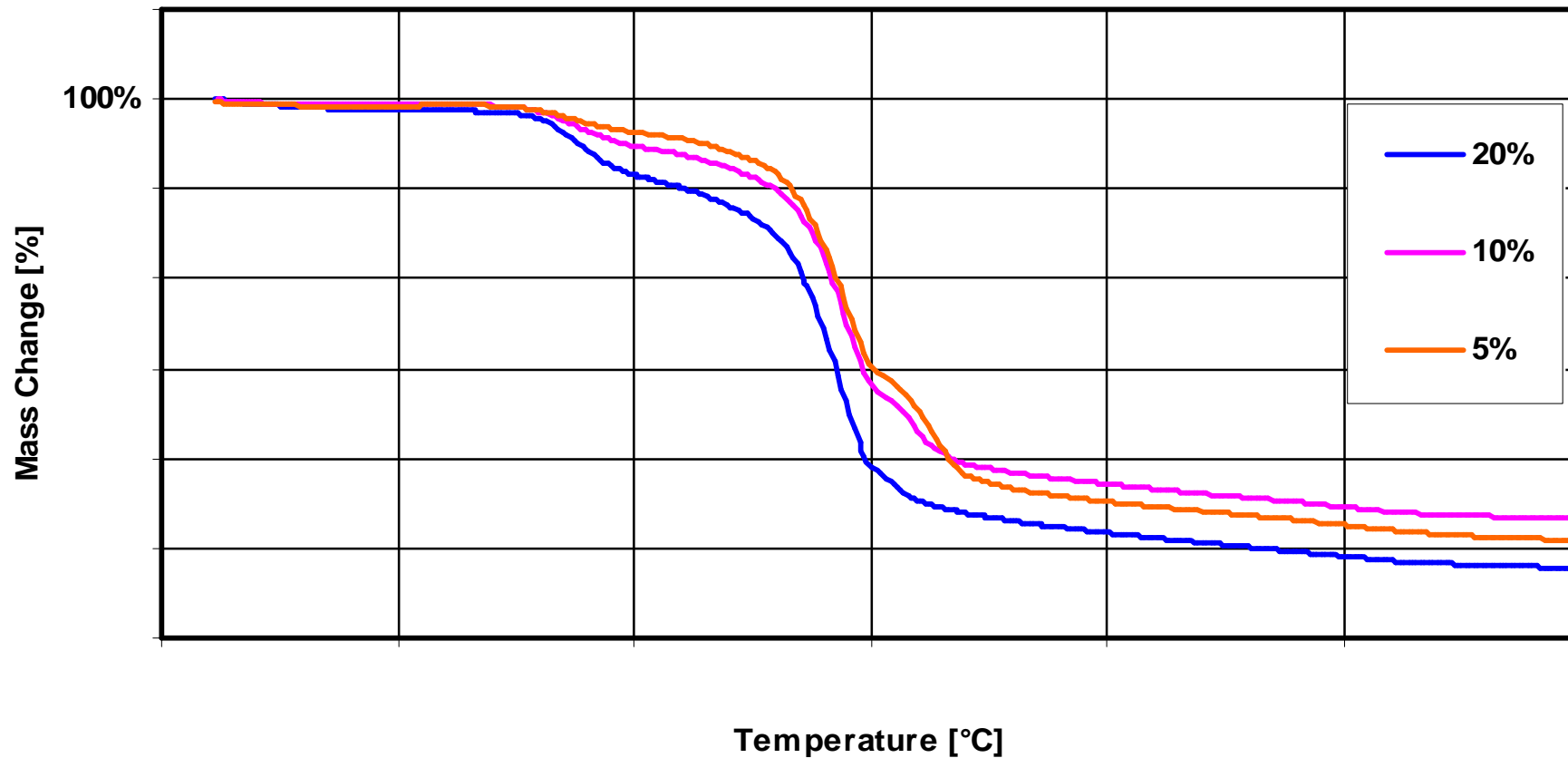
In the traditional firing the debinding time requires up to 50 % of the entire firing time



Uncontrollable reaction in the product

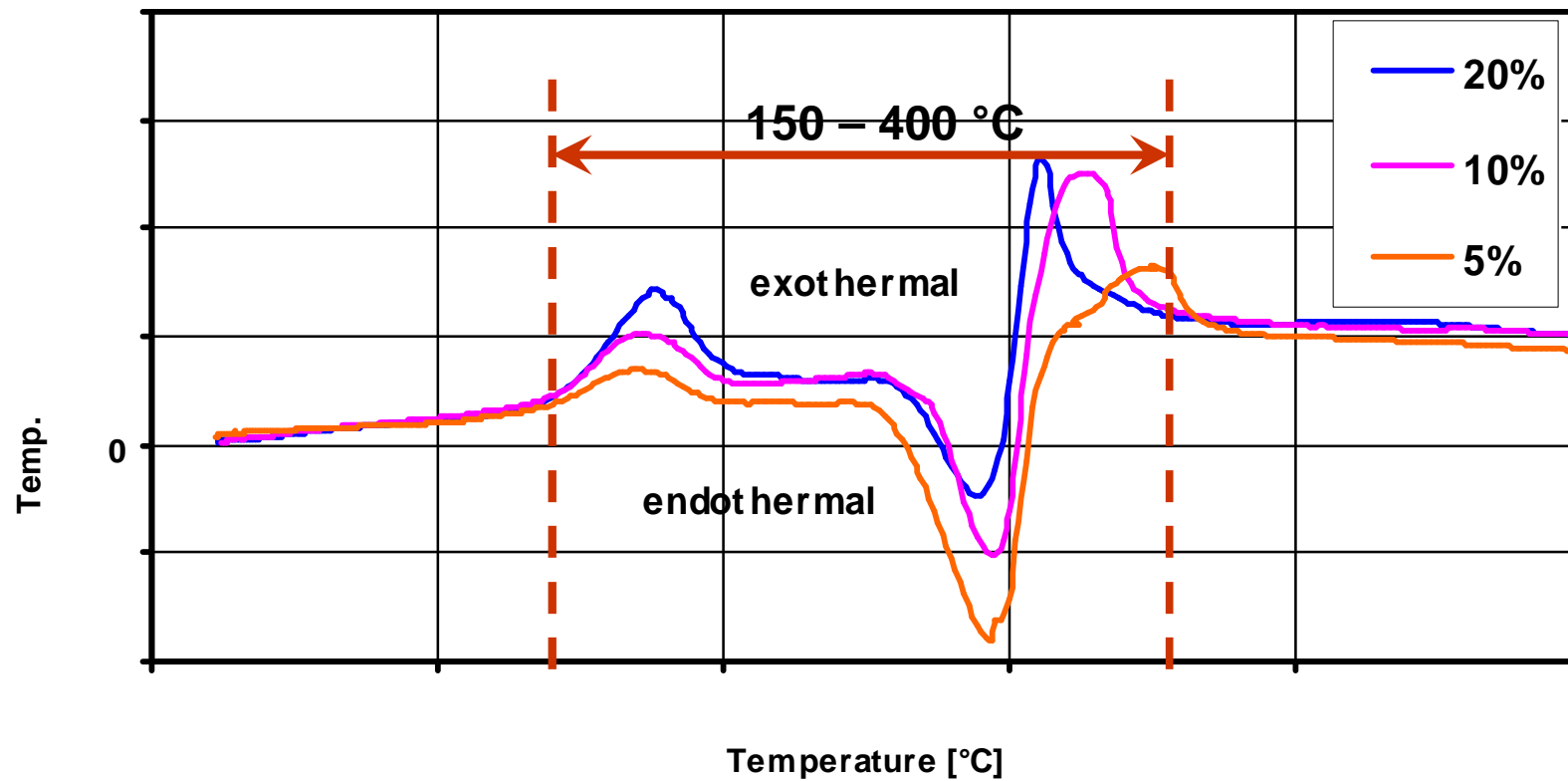
Almost the entire weight loss takes place between 150 °C and 400 °C

Mass Change Subject to O₂-Content



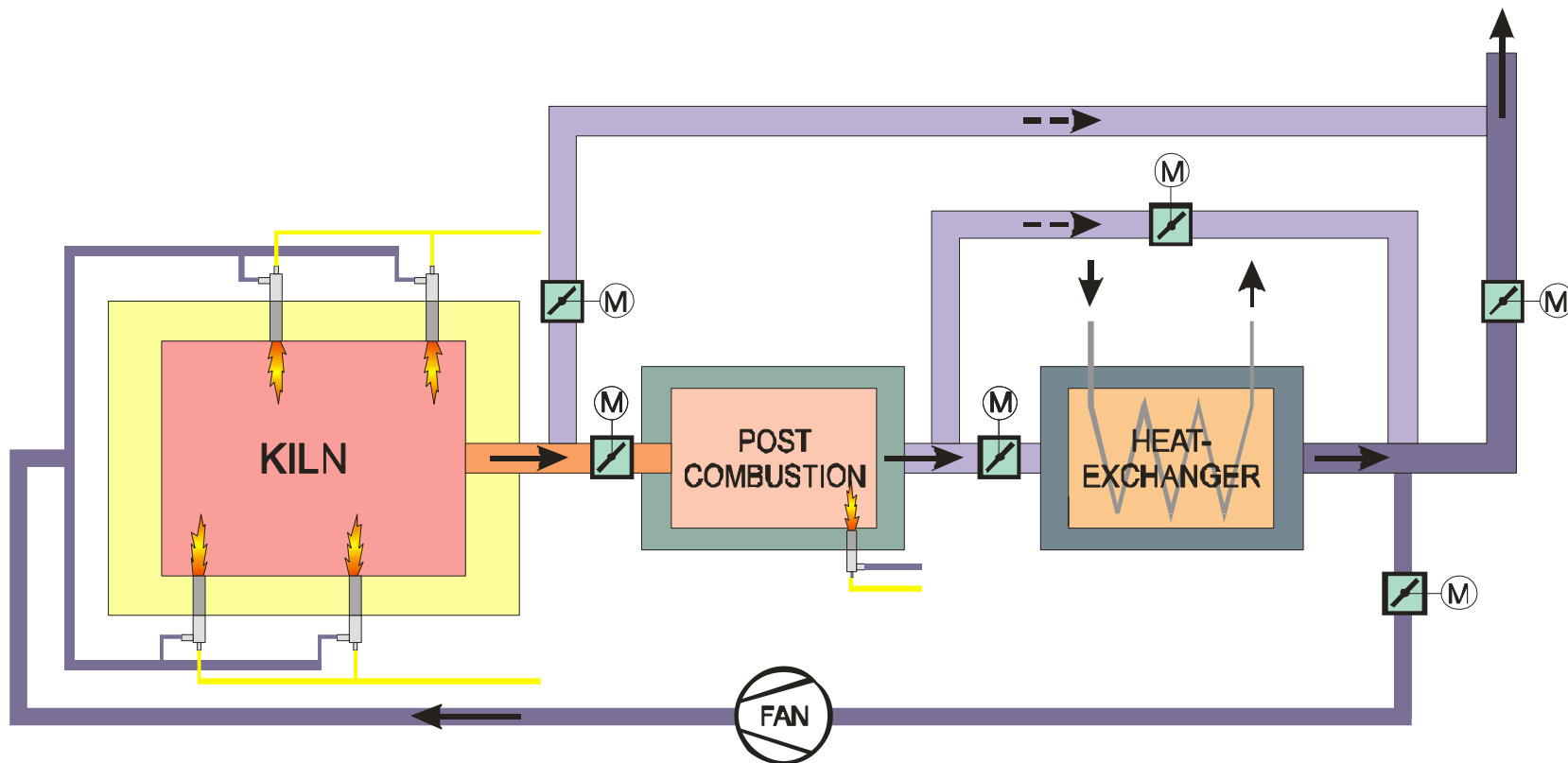
The strongest reactions run between 150 °C and 400 °C

Exothermic and Endothermic Reaction Subject to O₂-Content



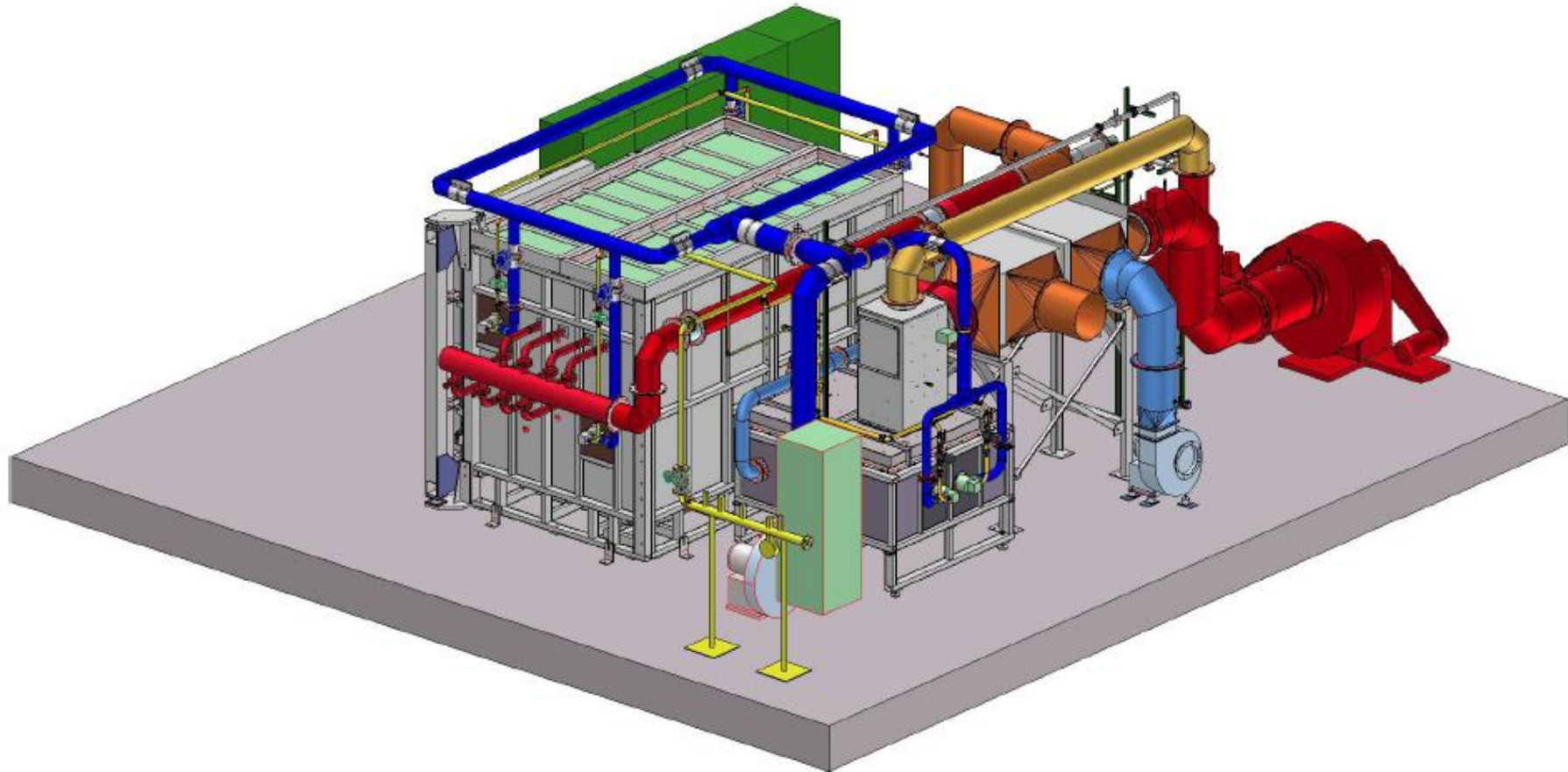
Discontinuously operated kiln plant with „Low O₂“ Technology

The „Low O₂“ technology principle for discontinuous firing



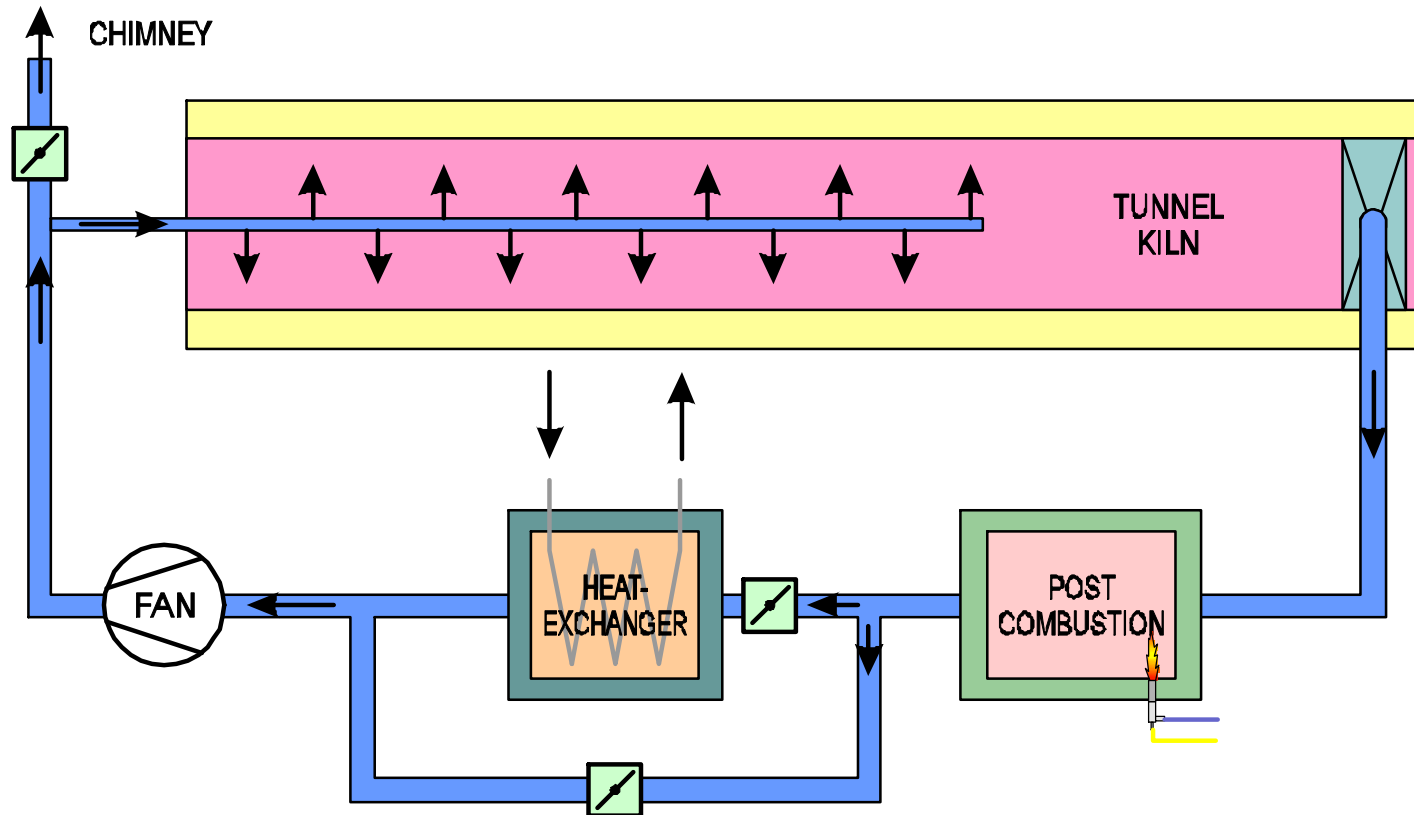
Discontinuously operated kiln plant with „Low O₂“ Technology

Shuttle kiln with „Low O₂“ technology



Continuously operated kiln plant with „Low O₂“ Technology

The „Low O₂“ technology principle for continuous firing



Continuously operated kiln plant with „Low O₂“ Technology

Debinding kiln



Gas-tight sintering kiln



Continuously operated kiln plant with „Low O₂“ Technology

Debinding zone of the tunnel kiln with following components:



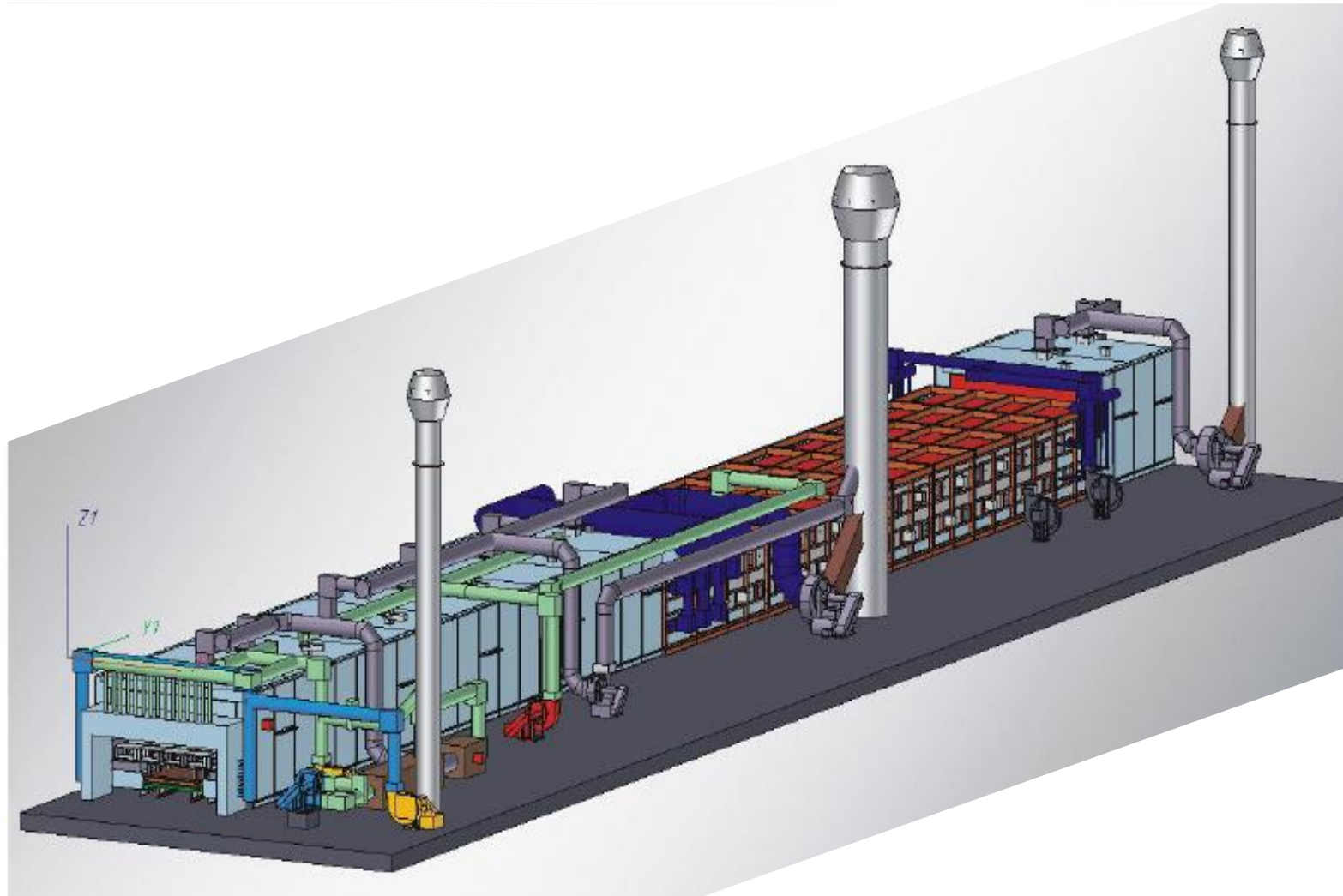
Air-water heat
exchanger

Thermal post-
combustion



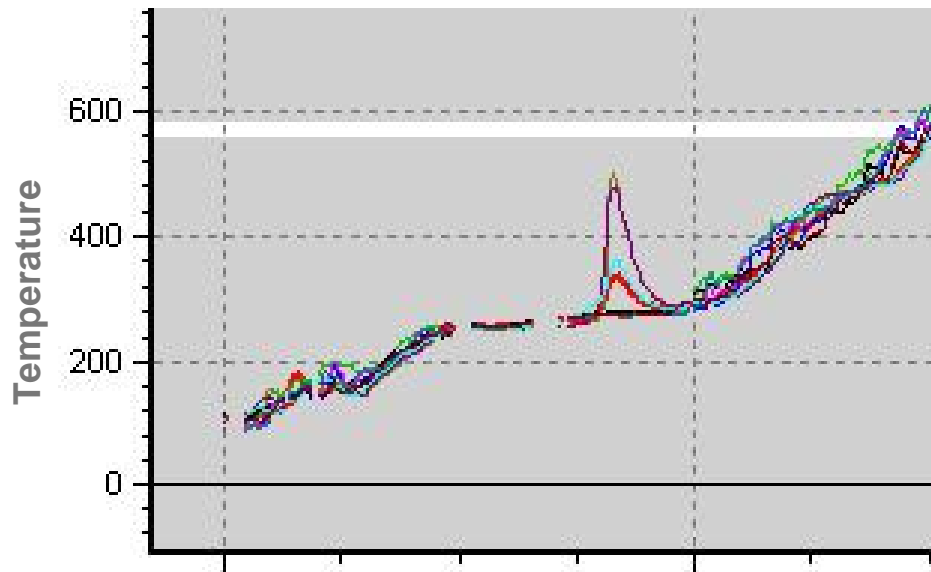
Continuously operated kiln plant with „Low O₂“ Technology

Tunnel kiln with „Low O₂“ Technology

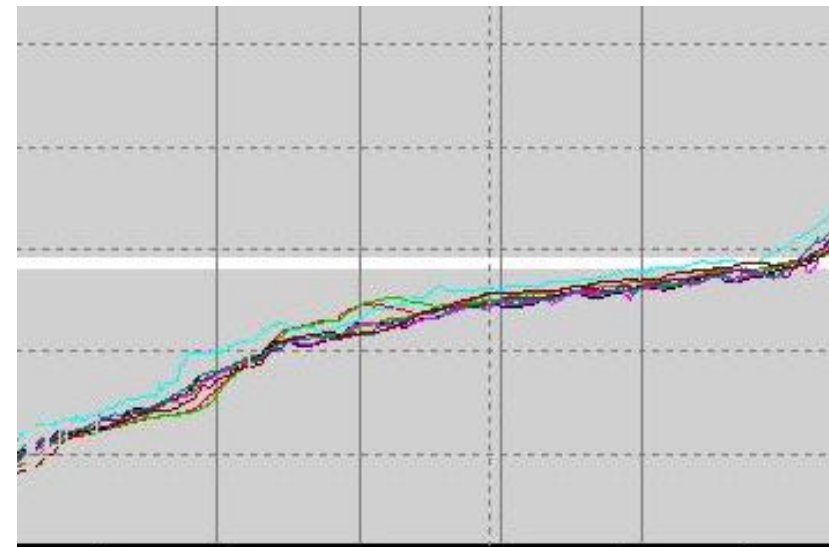


With „Low O₂“ technology firing time can be radically shortened

without „Low O₂“



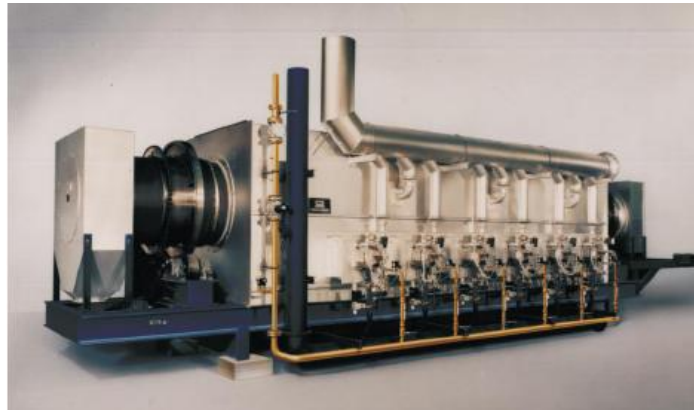
with „Low O₂“



Time

State of the Technology

Thermal treatment with „Low O₂“



Indirectly heated rotary kiln



Pit furnace for baking carbon



Gas-tight top hat kiln

Heat treatment of ceramics with a regulated kiln atmosphere is the stand of the art (e. g. hard porcelain)

Regulation of the oxygen content in a gas-heated kiln in a low temperature area is a real innovation with following advantages:

- „Low O₂“ e „O₂ control“ regulation of the kiln atmosphere in a wide area
- low investment cost
- low required space
- low energy consumption
 - Ø short duration of the process
 - Ø recirculation of waste gas
- Applicable für continuously and discontinuously operated firing processes
- Debinding and sintering in one firing cycle

