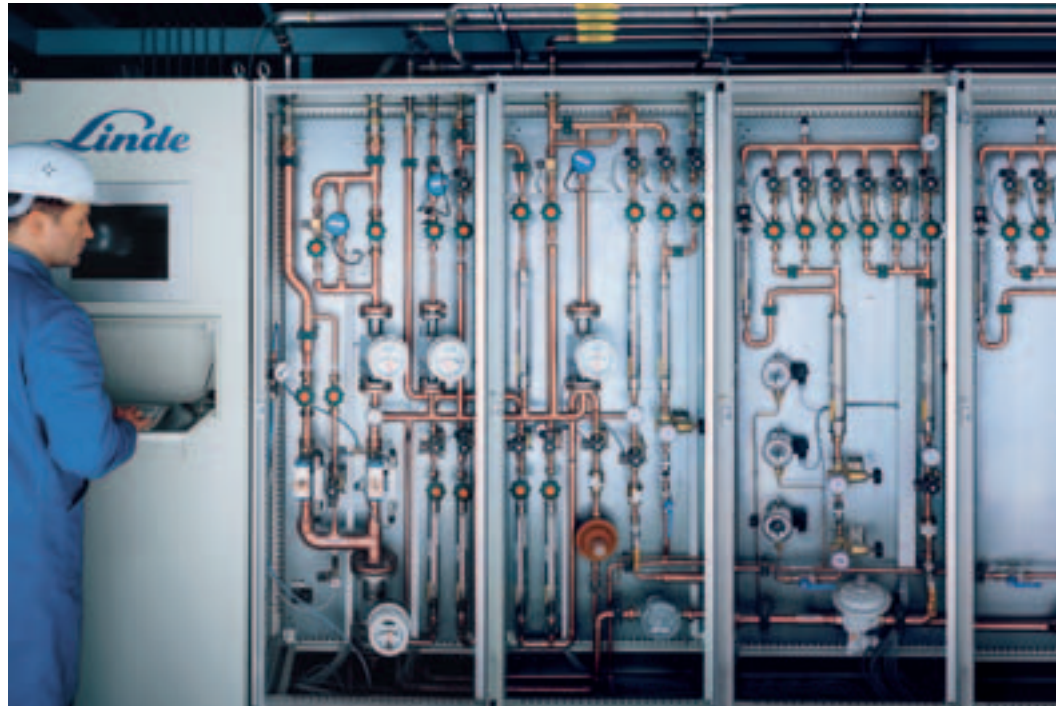


## CARBOFLEX® ACS. Atmosphere Control System.



**Description** CARBOFLEX® ACS is an atmosphere control system specially designed for advanced atmosphere control during carburising, neutral hardening and annealing in continuous furnaces. The system allows you to have full control over the carbon potential in up to four zones per furnace as well as to optimise the heat treatment cycle. Furthermore, the functions of this system provide an indispensable tool in quality assurance work.

**Benefits** Linde Gas has installed several CARBOFLEX® atmosphere control systems worldwide. All have satisfied our customers with the following benefits:

- Optimisation of the heat treatment cycle
- Increased productivity of up to 15% in many cases
- Enhanced process control
- Alarm for deviations from set points
- Easy operation with PC-based HM-interface
- Precise control of the surface carbon content
- Fulfilment of high surface quality requirements in terms of brightness and freedom from carbon deposits
- Quality assurance through advanced process control with recipes for different parts, dimensions and types as well as through easy collection of historical data
- High levels of safety by use of a minimum of flammable gases at the furnace inlet and exit and by a nitrogen based safety purge function
- Reduced costs due to minimised total gas consumption, reduced reject reworking and lower dependence on operator skills

**Operation** In order to achieve the required product properties, the process parameters are exactly defined in a process recipe. The recipes vary according to steel grade and quality, dimensional requirements, etc. Set points are defined in the CARBOFLEX® atmosphere control cabinet to meet the requirements for carbon content, surface appearance and process safety. A gas sample from a specific zone in the furnace is pumped to the control cabinet, where the sample is analysed. Up to five different sampling positions are analysed in sequence. Gas flows and mixtures are adjusted in the flow train to maintain the set points in the different furnace zones (based on the recipe) and to minimise gas flows in order to reduce cost.

## System Control cabinet

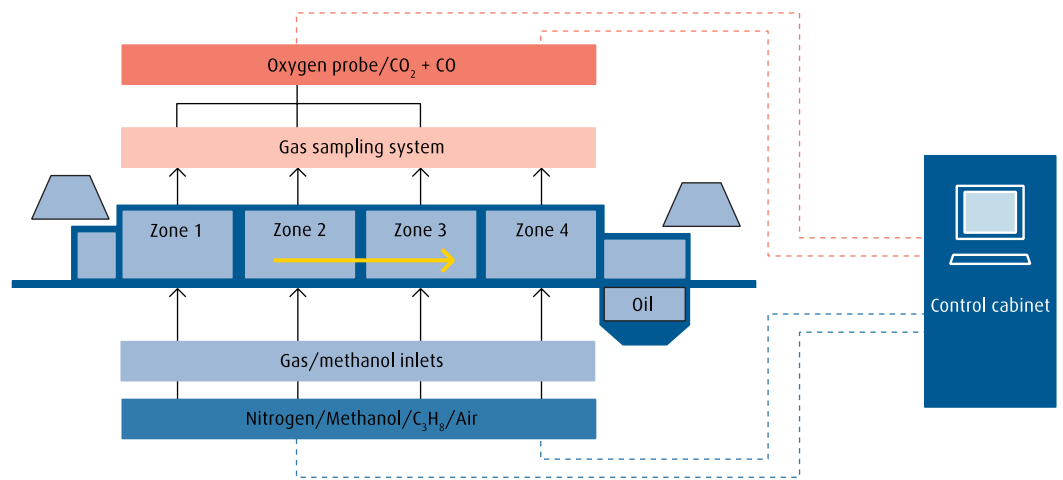
The cabinet contains:

- PC with touch-screen as man/machine interface
- PLC for process control
- Scanning system for up to five sample points
- Calculation of carbon potential for all zones
- Gas analysers for analysis of the furnace atmosphere
- Modem for remote supervision and control
- UPS (uninterrupted power supply) unit

Theory and process knowledge have been implemented in the software for handling of recipes, atmosphere control, historical process data, alarms, etc. The different parts of the system are connected via a PROFIBUS.

## Flow train

There are separate flow train cabinets for controlling the flow rate of nitrogen and enriching gases. In the event of safety-related alarms or power failure, the flows of flammable gases, such as endogas, natural gas and methanol, are automatically switched off and the furnace is purged with nitrogen.



Example of a closed loop atmosphere control system including atmosphere flow control, gas sampling, gas analysis and control cabinet

**Contact** Phone +49.89.31 001-680  
Fax +49.89.31 001-699  
heat-treatment@linde-gas.com

**Linde AG**  
Linde Gases Division, Seitnerstrasse 70, 82049 Pullach, Germany  
Phone +49.89.74 46-0, Fax +49.89.74 46-12 30, www.linde-gas.com