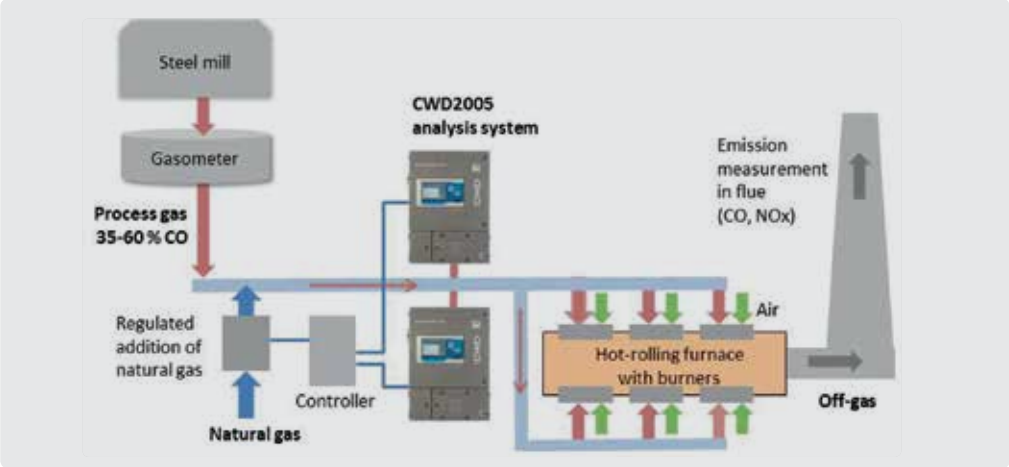
ECOLOGY AND ECONOMY

Utilize process gases instead of flaring them — Many process-related operations in the industry produce process gases that in the past have often been regarded as by-products and have been flared at the expense of the environment. This practice is changing in light of growing energy awareness.



Picture: Union Instruments

A redundant analysis system consisting of CWD 2005 calorimeters with fully-integrated gas analysis for CO, CH4, C2+ ensures efficient, environmentally sound combustion of process gases in hot-rolling furnaces.

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Today, even though they have less energy content than natural gas, process gases produced in many process-related operations are being collected in gasometers and used as combustion gas in place of natural gas in thermal processes. However, the fluctuating composition of the process gas, especially the CO content and the related fluctuating energy content, calls for special measures.

The energy content of the gas is stabilized by controlled addition of natural gas, which is essential for meeting the requirement for a uniform furnace atmosphere in each thermal process. A high-performance measuring system with fast response time, consisting of calorimeter and gas analysis, provides the controlled variable for conditioning of process gases for energy content.

In steel mills with hot-rolling mills, the process gases produced by the steel mill are to be utilized as combustion gas in the burners of the downstream hot-rolling mill.

The properties of the combustion gas must meet two very different requirements for this. A defined excess of air must be ensured in the various zones of the furnace to achieve the desired steel quality. Simultaneously, the CO concentration in the off-gas from the flue must not exceed a defined limit since the plant will otherwise be shut down automatically pursuant to the Emissions Directive. The plant operator must quickly and accurately detect the changes in process gas composition and, on this basis, add natural gas in a controlled manner to continuously meet the two requirements. This is only possible using gas measuring technology with corresponding performance capability.

One measuring system that is specially configured for this task is the CWD2005 direct calorimeter from Union Instruments with additional integrated gas analysis and measured value processing. The system directly determines the Wobbe index and gas density values as well as the concentrations of CH4 and C2+. The heating value and air requirement are also calculated from this. Altogether the information from the calorimetry and gas analysis is a basis for sufficiently accurate control of the gas addition. Of particular importance is the higher air requirement for combustion of alkanes (CH4, C2+, etc.) compared to CO, which the gas analysis takes into account by determining the concentration of these two components.

It is also important that the measuring device reacts fast enough to ensure the control process, which requires special measures due to the size of the plant and the mixing of gases in the pipes. Union Instruments has developed a computational model based on delay elements that can be adapted to different dimensions by assigning parameters. To increase availability, the measuring system can be designed redundantly. In this case, each system supplies its measured and converted values to the controller, which then determines the controlled variable for the mixing device.

The measuring technology described contributes to energy-efficient and safe (with respect to explosion and poison hazards) use of process gases as combustion gas anywhere these gases are used.

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