ENERGY MANAGEMENT: HEAT TECHNOLOGY ANALYSIS OF COMPLEX PROCESSES

Ideas on utilisation

Numerous industrial plants with a high heat consumption are composed of complex-networked partial processes with many material and heat flows. More efficient use of energy can cut costs and increase competitiveness. The crucial questions that need to be clarified before implementing energy optimization measures are: What is the potential for saving heat? Which optimization measures make sense both technically and economically? The assessment of the heat-saving potential and the targeted adaptation of optimization measures can be carried out systematically by means of a thermal analysis, in which the real plant is simplified as a network of heat and material flows. The heat requirement and waste heat flows of as many sub-processes as possible in terms of heat quantity and temperature level are characterized over a longer period of time. The plant-related database obtained with this method provides a transparent decision-making aid for or against measures for heat recovery or for improving individual (particularly inefficient) sub-processes.]
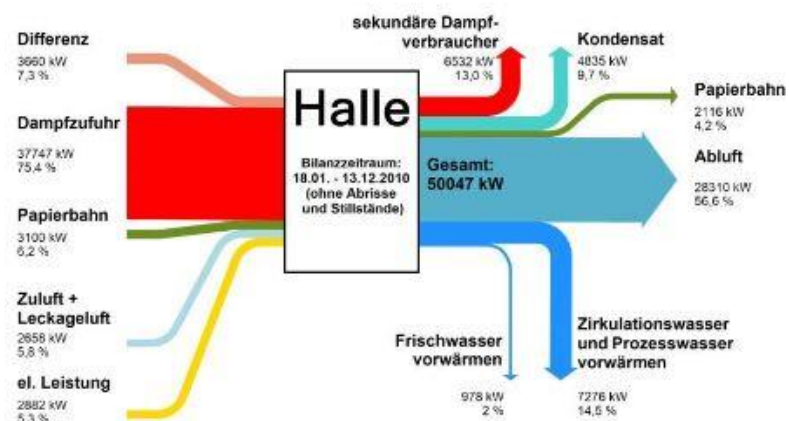

Figure: Sankeydiagramm over a period of eleven months - averaged heat flows of the hall (readings) - in comparison with one-time measurement allows long balance period analysis of heat consumption for different environmental and production conditions.

Potential adopters of technology

- Plant personnel for the energetic monitoring of individual processes
- operators of heat-intensive systems that want to reduce their specific consumption
- Planner of heat efficiency improvement measures BEFORE implementing a measure
- Energy consultants who want to use a transparent method for energetic asset valuation

Advantages of technology

- Assessment of the heat saving potential

- Detailed understanding of the coupled processes in a large plant → conclusions on optimized operation management

- Control and diagnosis: detection of malfunctions such as defective heat exchangers

- Long-term analysis: influence of seasonal fluctuations and different production conditions

- Energetic evaluation of the current production with data interface to the process control system

- Case studies ("what if?" Analyzes) allow predictions to be made on the plant and its impact on the production process in advance.

Market and context of technology

- The thermal analysis has been used as an example on several heat savings identification plants. On the basis of the analysis results, saving measures were derived which correspond to a heat saving of up to 10 percent.

- In practical use in various industries, we have found that the time to create the facility model needs to be reduced.

- As a next step, we want to implement the method in an easy-to-use modeling tool, so that the effort for analysis decreases.

Preconditions in adopting enterprises

- The system must be equipped with measuring technology or retrofitted.

- Measurement data must be available for as long as possible.

- The documentation of the plant (flow diagrams, site map sensors, ...) must be complete.