

1 *Demonstration scale fixed-bed heat storage unit for the investigation of dust exposure effects.*

THERMAL STORAGE UNIT CONVERSION OF WASTE HEAT TO HIGH-QUALITY PROCESS ENERGY

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Dependent on the process, waste heat is often produced not on a constant, but on a fluctuating level. Especially in energy intensive industrial sectors, considerable amounts of waste heat with a potentially usable temperature level are produced. New innovative concepts enable the conversion of this waste heat to high-quality process energy, thereby increasing the overall energy efficiency.

Thermal storage units make use of both sensitive heat and the phase change energy of selected materials. They are hereby able to produce a temporal decoupled and constant heat flow for varying durations, thereby matching heat supply requirements of processes. The heat flow generated by the storage system can for example be used for the generation of process steam or for power generation in a combined heat and power process.

Keywords

- Thermal storage materials
- Analyses for cycle stability and heat capacity
- Fluctuating thermal discharge
- Flue gas purification
- Process development
- Thermal discharge utilisation concepts

Sectors

- Chemical industry
- Metal and glass industry
- Waste incineration plants
- Biomass power stations
- Construction of combined heat and power plants
- Refrigerating plant construction
- Energy generators and consumers
- Manufacturing sector



2. Aluminium oxide

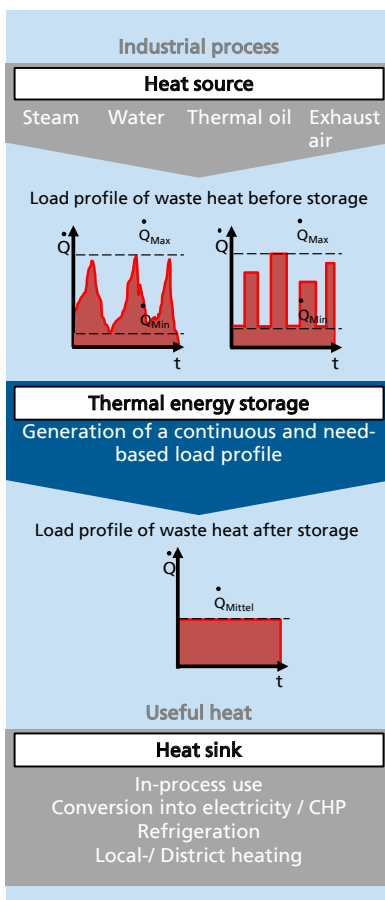


Volcanic rock



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- 1 Demonstration center Fraunhofer UMSICHT Institute branch Sulzbach-Rosenberg.
- 2 High-temperature storage material.
- 3 Sodium acetate trihydrate with solid-liquid phase transition for storage of latent heat.



Thermal storage units concept

- Definition of the application case
- Identification and assessment of new material systems for heat storage
- Test of storage media (phase change material, bulk materials)
- Analyses regarding long-term stability and rate of efficiency
- Trials in the technical center with ash/dust-loaded exhaust gases
- Measurement series with fluctuating waste heat flows
- Verification of potential optimisation measures

After the selection of a suited storage material, surveys regarding the long-term stability and loading and/or discharge are carried out at the demonstration center of Fraunhofer UMSICHT. It is possible to simulate heat flows with temporal temperature variations and varying dust load in order to represent the application case as application-oriented as possible. An intense support and evaluation of the measurement data allows for the determination of the optimum operation parameters for your waste heat utilisation concept which we will support during its implementation.

Our service

In accordance with your application, Fraunhofer UMSICHT analyzes the occurring physical stress of the latent or sensitive storage material – such as the dust load in exhaust gas – and defines certain minimum requirements for the system. Relevant parameters are, for example, the loading temperature and number of cycles. Based on the defined requirements profile, potential storage materials are defined and information regarding the availability and price level of the substances are determined.

Your benefits

Fraunhofer UMSICHT looks back on many years of expertise in the area of thermal energy storage and its application in the processes. In different pilot plants, bulk materials and PCM were investigated concerning their physical characteristics as thermal storage units. At the same time, the function of the flue gas purification was analysed and verified for the bulk material storage units. Moreover, thermo-chemical storage materials are also part of the portfolio of Fraunhofer UMSICHT.