



Seit 1877

Kiefer

Luft- und Klimatechnik

Neue Wege mit Luft

Concrete core cooling with air

New cafeteria and library at the Grimmelshausen Gymnasium in Gelnhausen



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For a total of 7 million Euros, the Main-Kinzig district as the school authority built a multifunction building with a size of more than 2,000 square meters of surface area on the former Hempel property.

The cafeteria is located in the basement of the building, with 430 m² of useful area for 180 visitors, as well as kitchen space and corresponding equipment rooms. By moving the school library to the new building, space was created in the main building for expansion of administrative spaces. The school library maintained on the first floor with an area of 420 square meters and with a lecture hall is an invitation for learning and reading, with internet-linked work spaces.

The new building was designed in close collaboration with the German Council for the Handicapped and is completely barrier free. The project was planned by the architects Hänsel and Rollmann, Gelnhausen.

Object: **Grimmelshausen Gymnasium, Gelnhausen**

Architect: **hkr.architekten, Gelnhausen**

Proprietor: **Main-Kinzig district school**

Consultant: **Ingenieurbüro TGE, Gelnhausen**

Scope: **Planning of the heating, ventilation and sanitary facilities:**

Air flow rate for Concretcool only

Cafeteria in the basement: 3,000 m³/h

Library and foyer on the main floor: 3,200 m³/h

Multifunction rooms on the main floor: 1,250 m³/h

Technical data:

Pellet heating system, 150 kW for floor heating, radiators and the building ventilation system

Total air flow 18,400 m³/h in 5 air conditioning sections with heat recovery (cross-flow heat exchange)

48 kW chiller, air-cooled

Measurement and control system by Sauter

Heating, ventilation and sanitation system costs: 650,000 Euro





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The building was designed as a low-energy building according to the guidelines of the Energy Efficiency Ordinance. To do so, the engineering firm of TGE, Gelnhausen, a firm known for its energy-optimising building plans and for its open innovative technologies, utilised a pellet heating system and a central fresh air feed system with specially-designed heat-recovery ventilation equipment for each of the various areas being used. The fresh air, with specified air exchange rates of between 7.2 and 9 m³/h m², is not fed directly to the rooms, but first flows through cooling tubes inside the concrete ceiling. While it flows through, the cold feed air heats up to approximately ceiling temperature. This achieves an outlet temperature of about 21°C entirely without a re-heater, resulting in an overall heat recovery of more than 95 %. Through appropriate climatic specifications, and with the potential of free cooling, favourable operating costs and energy savings are achieved which would otherwise not be possible. By reclaiming energy from the concrete ceiling, an optimum thermal comfort is achieved for the building.

Function CONCRETECOOL

In contrast to conventional systems, the feed air is not fed directly to the room, but first flows through aluminium cooling tubes embedded in the ceiling. The feed air cools the ceiling in the process. At the same time, the heat recovered is used to heat the feed air.

System advantage

- Optimum thermal comfort
- Additional ceiling cooling with water is not required
- Free cooling provides energy savings of up to 50%
- Full flexibility due to modular positioning of cooling tubes
- Cooling with outdoor air – no air circulation required
- Construction costs reduced due to low floor height



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