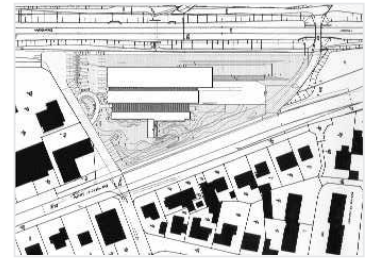


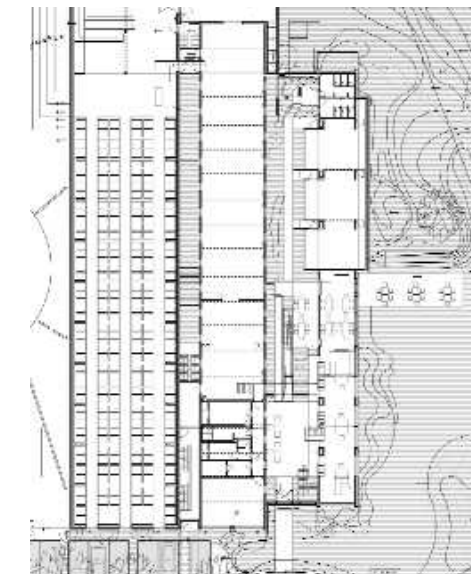
Architectural Design
Energy Concept
Building Physics
Controlling:
Monitoring:
Client:
Location:
Occupancy:
Gross volume
Net floor area
Building Cost*

Atelier für Architektur und Städtebau
Dipl.-Ing. Martin Zimmer, Darmstadt
Technische Universität Darmstadt,
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SurTec GmbH, Zwingenberg
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2000
28,380 m³
4,423m²
310 DM/m³
1,990 DM/m²

* DIN 276, building construction + HVAC (per m² net floor area) inclusive tax, exclusive planning cost



site plan



ground floor



cross section

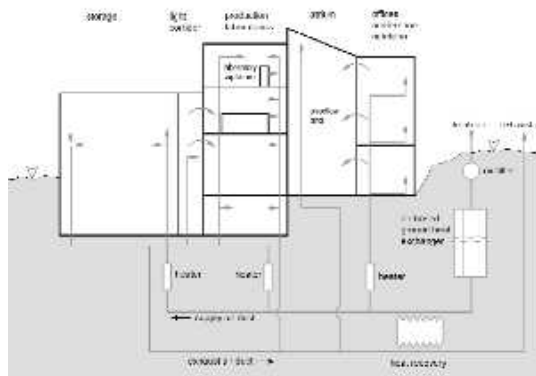
This building is the first factory which aims to reach the thermal standards of a "passive house". The annual demand for space heating is projected at 15 kWh/m²a. The heating will be completely centralised by heating supply air. Minimal heating demand means that circulated air supply, as usually necessary, can be dispensed with. In this case of chemical processing, the special requirements are to design an energy efficient ventilation system, creating different thermal zones within the same building (warehouse/production/atrium/office) and to optimize the building envelope according to a high thermal insulation standard.

Ventilation / Heating

Air is mechanically channelled into and extracted from the building, which is exclusively heated by warmed incoming air. If necessary, the different areas of the building can be supplied by separate heating registers. Several installations are located within the thermal shell of the building.

Winter: Incoming air is pre-conditioned (> -5°C) and when necessary, is additionally centrally heated by passing through the heat exchanger (T_{max} = 45°C) from where it is directed along the façade over one of the double floors of the offices. Waste air is siphoned off via several high points in the atrium. The atrium is the meeting point of air passages and is therefore heated indirectly. The production areas and the warehouse (temperature requirements between 16°C and 18°C) have separate air passage systems and heating registers. For safety reasons, the area of production and laboratories are subjected to a minimal negative pressure. Some of the production and storage areas have additional extractors.

Summer: The ground heat exchanger is a central part of the summer cooling concept. In addition, the RWA flaps on the high points of the atrium can be opened for night flushing.



heating and ventilation scheme

Daylight / Lighting

Side windows provide a simple supply of daylight to the 4.2 m wide offices. Glare can be avoided by internal blinds. Shading is provided naturally by fast growing climbers, supported by trellises. The building development benefits from the light which penetrates the roof and façade of the atrium. The atrium roof has external blinds to provide shading in summer.

Project Description

In June 2000, the building in the northern part of the small Hessian town of Zwingenberg became the new head office of the SurTec company. SurTec develops, produces and distributes chemical products for the treatment of metal surfaces, especially industrial cleaning agents and coating systems. The plan of the building includes a high bay warehouse (1,500 m²) work and production rooms (1,600m²) as well as office and conference rooms (600 m²). The design of the so-called "passive house" resulted from the architects persuading the owner that a high level of energy efficiency can be obtained without increasing costs.

The site is a waste area between the rail tracks of the Frankfurt-Mannheim route and a federal road. Because of the shape of the site and the noise pollution levels, the building is set on a north-south axis with the high bay warehouse facing the railway track. The warehouse is partially sunk into the ground.

The body of the building is structured into three differently styled parts which are connected by intermediate glassed-in rooms. There is a thin corridor of light in between the warehouse and the production rooms. An atrium separates the office block from the main phases of manufacture in the production rooms. The office, laboratory and production areas are in a solid three-storey reinforced concrete construction, whereas the warehouse and the atrium stretch to the full height of the building in a single storey only. The warehouse and production areas have a cellar.

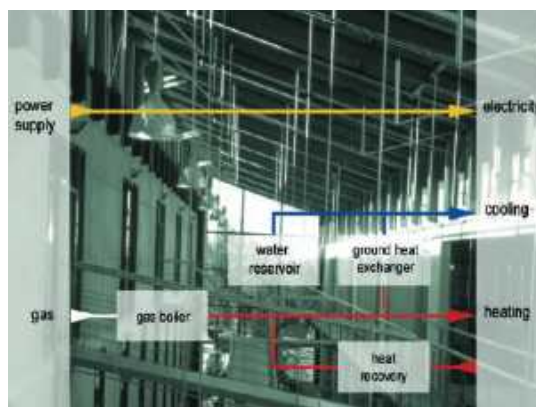
Energy Supply

- central gas useful heat boiler
- ventilation with heat recovery

Energy Figures

heating supply*	80 kW
A/V ratio	0.25 m ⁻¹
Mean U-value	0.27 W/m ² K
Q _{h/V,max}	18.2 kWh/m ³ a
Q _{h/V,available}	10.2 kWh/m ³ a
Q _{h/A,available}	31.7 kWh/m ² a
Difference Q _{h/V}	44 %

* heating, hot water supply



contact: www.iea-shc.org/