

Pollmeier administration centre



The new administration building for the company Pollmeier in Creuzburg (Germany) stands out due to its extraordinary architecture, and was awarded the "Fassadenbaupreis" (German facade construction award) in 2002. At the same time, it is a highly energy-efficient building; for example, the window surface areas are dimensioned according to the cardinal direction. The building services equipment was kept simple and cost-effective, and adheres to the "slim building" concept. Implementation of active cooling was successfully avoided. The energy supply is partly renewable due to the company-owned local heating system, and the photovoltaic system.



In 2002 the administrative centre of Pollmeier was awarded with the German Facade Prize.
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Building summary

Project status	
Location	Pferdsdorfer Weg 6, 99831 Creuzburg
Completion	08/2001
Inauguration	02/2002
Building owner	Pollmeier Massivholz GmbH (+ Betreiber, Nutzer)
Heated net floor area	3.510 m ²
Gross volume	16.847 m ³
main usable floor area	3.489 m ²
A/V ratio	0,32 m ² /m ³
Key aspects	Atrium, Daylight planning, Optimised lighting, Ventilation + heat recovery, Regenerative + passive cooling, Heat pump, Photovoltaics, Biomass utilisation, Optimisation of operations

Project description

The new administration building, which belongs to the sawmill operator Pollmeier, a medium-sized company with 400 staff members, is based on a modern architectural language. The objective of the contractor and planners was to create a building with high quality workplaces, along with ambitious energy characteristics. The building's heat supply is based on the company's local heating system, which runs on renewable waste wood.

Building concept

The building has a square layout, surrounding a roofed atrium which spans the centre of the building. The floor area of the ground floor is smaller than that of the storeys above, which results in an overhang which also performs a sun protection function for the ground floor. Overall, the building exhibits a relatively high standard of insulation: the windows have thermally insulating double glazing, the exterior wall has 30 cm-thick insulation, and the roof 20 cm. The average U value is 0.29. The ventilated facades consist of prefabricated wooden elements, which are covered on the outside by thermal insulation and large-scale hanging fibre-cement panels. On the interior, to increase the thermally utilisable mass, exposed concrete elements have been installed, some of which have been covered with fabric.

Energy concept

The building services equipment has been kept consistently simple and cost-effective. Implementation of active cooling was successfully avoided: via a heat exchanger, the building is connected to the sawmill's own combustion system which is operated on a completely renewable basis, using waste wood and wood shavings. A relatively simple air extraction system provides ventilation. In the ceiling area of the central service blocks, the indoor air is extracted by suction, and regulated during the day by means of air quality sensors. The fresh air requirement can be individually controlled via manually adjustable air supply elements. These specially developed facade elements meet the requirements of thermal insulation and noise insulation, and optically suit the facade well.

For cooling the building in summer, the air extraction system switches to air renewal during the night with a factor of 1.5, which expels the heat (stored during the day) from the building. The cooling load of the server room, which is around 80W/m², is mostly discharged via an individual air intake system. In the event of very high outdoor temperatures, a recirculating cooler is activated.

A heat pump, integrated into the exhaust air flow, is used during the summer months for provision of hot water.

Performance

Heat consumption and electricity consumption were initially considerably above the target values. The lighting, which contrary to expectations is switched on throughout practically all working hours, increases electricity consumption. The measured heating requirement is between 60 and 65kWh/m² p.a., and exceeds the planned values by around 70%. This is largely accounted for by the room temperatures, which are 2 to 3 degrees higher than estimated. As expected, the heat pump covers approximately 10% of the energy consumption. However, due to the poor seasonal performance factor, deactivation of the heat pump in summer must be considered. The air extraction system provides demand-oriented ventilation with a high degree of comfort. During the last two summers, overnight ventilation exhibited the hoped-for effectiveness. If the windows are also opened during the night, temperatures reduce further. The thermal comfort values determined within the scope of this project are within the limits specified by the German DIN industry standard. Only the relative ambient air humidity drops below 30% in the winter months.

Occupant satisfaction: in a July 2002 survey, the occupants voiced widespread satisfaction with regard to the indoor temperatures. The air quality is perceived to be good, yet decreasing during the day, and for this reason windows are opened. There are large differences in the assessments of the level of daylight: half find it good, while half find it middling to poor. Solar glare occurs in a significant majority of the workplaces. The reason for this is the transparent nature of the sun protection, which entails excessive light intensity in direct sunlight. The majority consider the artificial lighting to be just right, while one third find it insufficient.

Optimisation

The light situation is a starting point for optimisation. Due to the interior design, an atmosphere has been created, which indeed is perceived as pleasant to all intents and purposes. However, the level of daylight in the workplace is greatly reduced. This situation is caused by the dark design of the furniture, the floor, and the wall panelling, as well as the use of perforation in the bright ceiling area for improvement of the indoor acoustics. Only large-scale intervention in the work organisation or interior architecture could improve the situation. Replacement of the 100W filament bulbs which were initially installed for desk lighting can save approximately 4.08MWh per annum. These have now been successively replaced. Furthermore, it is evident that the lighting control via decentralised sensors is not yet functioning as desired. Here, additional optimisation measures are possible.

Costs

With the slim building concept, very favourable costs for building services equipment are achieved. The costs for construction of the building are in the medium range, due to a number of rather expensive construction and design features.

Key energy data

Energy indices according to German regulation EnEV (in kWh/m ² a)	
Heating energy demand (according to German regulation WSchVo 95)	32,00
Overall primary energy requirement (according to LEE, based on heated net floor area)	37,00
Measured energy consumption data (in kWh/m ² a)	
Thermal heat consumption (in 2003, based on heated net floor area)	60,60
Total source energy	73,40
Building services and lighting	19,50
Working appliance/miscellaneous	32,20

Data of 2003, based on heated net floor area

Implementation costs

Costs of implementation in €/m ²	
Construction (KG 300)	1.034
Technical system (KG 400)	280

These figures represent calculated costs

Net construction costs (according to German DIN 276) relating to gross floor area (BGF, according to German DIN 277)