Multi-Purpose Sports Hall with Canteen – Schäfersfeld School Centre, Lorch

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Mark Arnold + Arne Fentzloff, members of the BDA (German Architects' Association), Stuttgart

Unique and timelessly modern architectural language – that's the best description of the new multi-purpose hall, designed by Stuttgart architects, ARCHITEKTUR 109. It also fits in effortlessly with the rest of the school campus, designed by the architect Günter Behnisch and built between 1973 and 2003.
To the east of the existing three-field sports hall, an attractive break-time area has been created for the school children: the floor was cut into the slope and it is enclosed by a concrete wall with a view of the valley. Beneath the courtyard, the two halls are connected to each other and share changing rooms. Sports equipment can be easily transported from hall to hall. All of the important entrances and corridors in the lower floor have natural light provided by ribbon glazing, which leads the whole way to the changing rooms.
The generous canopy over the entrance area on courtyard level provides a protected waiting area and leads into the foyer with a view of the three-field hall. Cool and clean materials and colours define the overall look of the space: pale green walls, visible concrete surfaces and black steel roof-beams with wooden panelling in between. This is framed by the surrounding steel and glass construction, the translucency of which varies with the completely transparent glass surfaces, ensuring carefully chosen glimpses and views of inside and out.
The view from the canteen was deliberately chosen for the 200 school children who eat there: on the one side the hall, on the other, towards the valley, Lorch's former Benedictine monastery surrounded by magnificent old trees.
The building is heated by a gas central heating system which also heats the rest of the school buildings. There is also underfloor heating in the halls, stands and the canteen. A mechanical ventilation system regulates the air directed out of the building via ventilation openings in the façade as well as the skylights in the ceiling. Four geothermal pipes heat air entering in winter and cool it in summer, ensuring a comfortable climate in the building.

The materials chosen were selected because they were functional, economical, low-maintenance and durable. The use of industrial products (twin-wall sheets, large-format Kerto-boards, standard profiles in wood and steel construction, industrial coatings on large floor areas, etc.) is part of the overall design. The materials selected for the hall have already proven their durability despite constant use.

"Despite a tight budget, through creative thinking and architectural discipline, and precise planning, the architects managed to achieve a visually impressive, even elegant building, which fits in with the neighbouring buildings despite its modern style."

Prof. Falk Jaeger in BAUMEISTER magazine (B7 2010).

Supporting structure

Bernhard Rummel,
Weischede, Herrmann and Partner GmbH, structural engineering

The huge elevated ground floor is cut into the hill slope of the school grounds, resting on on strip foundations and individual foundations. In some cases foundation piers were dug down as far as the supporting sandstone.
Regularly positioned wall bulkheads strengthen the exterior walls against the pressure caused by the slope and carry the vertical load of the building above.
On the valley side a pre-stressed cast-in-place concrete ceiling cantilevers by 5m. The pre-stressing without composite was carried out with monostrands.
The supporting structure for the hall is a steel frame construction with a span length of L= 27.5m. The vaulted frame shafts were only welded to the horizontal members (HEA 800) on-site.
The supporting shell of the roof is made up of wooden purlins at intervals of 80cm, on to which alternating large-format wooden panels, up to 15m long and made of Kerto Q (d = 33mm) were laid.
The roof surface was designed as a static effective sheet to carry the horizontal load. It releases the force into the frame and also to vertical wind bracers on the long sides of the hall.
Through the use of standard profiles and industrially pre-fabricated elements, the hall was easily constructed and economical. It was constructed using local construction workers only, without requiring specialist companies, in a very short space of time.
The minimal and clearly structured supporting structure meets the high design standards and fits in perfectly with overall architecture of the hall.

Energy Design for the Sports Hall in Lorch, Germany

Kai Babetzki,
Transsolar Climate Engineering, Stuttgart and Munich, GERMANY and NewYork City, USA

The main feature of the project communicated to us by local authorities was that the sports hall was to be used as a multi-purpose hall. On the other hand we were told that the sports hall would mostly be used for sports and not for other purposes.
As is often the case, the budget was extremely tight. The challenge for this project was to meet the requirements for a multi-purpose hall without going over budget.
Late changes and additional space requirements, such as a canteen for the pupils, could only be solved with a simple and flexible energy design. To make a building as energy efficient as possible always requires a three-step approach.
Firstly, the building itself must be energy efficient. It must have the right orientation, a reasonable window ratio, a well-insulated skin and sufficient thermal mass or air volume.
Secondly, it must have energy efficient building technology, for example radiant heating and cooling rather than convective heating and cooling, duct work with low-pressure drop for mechanical ventilation, displacement ventilation instead of mixed-mode ventilation.
The third step is to use locally available renewable energy sources as geothermal energy, daylight and the cooling potential of low ambient air temperatures at night..