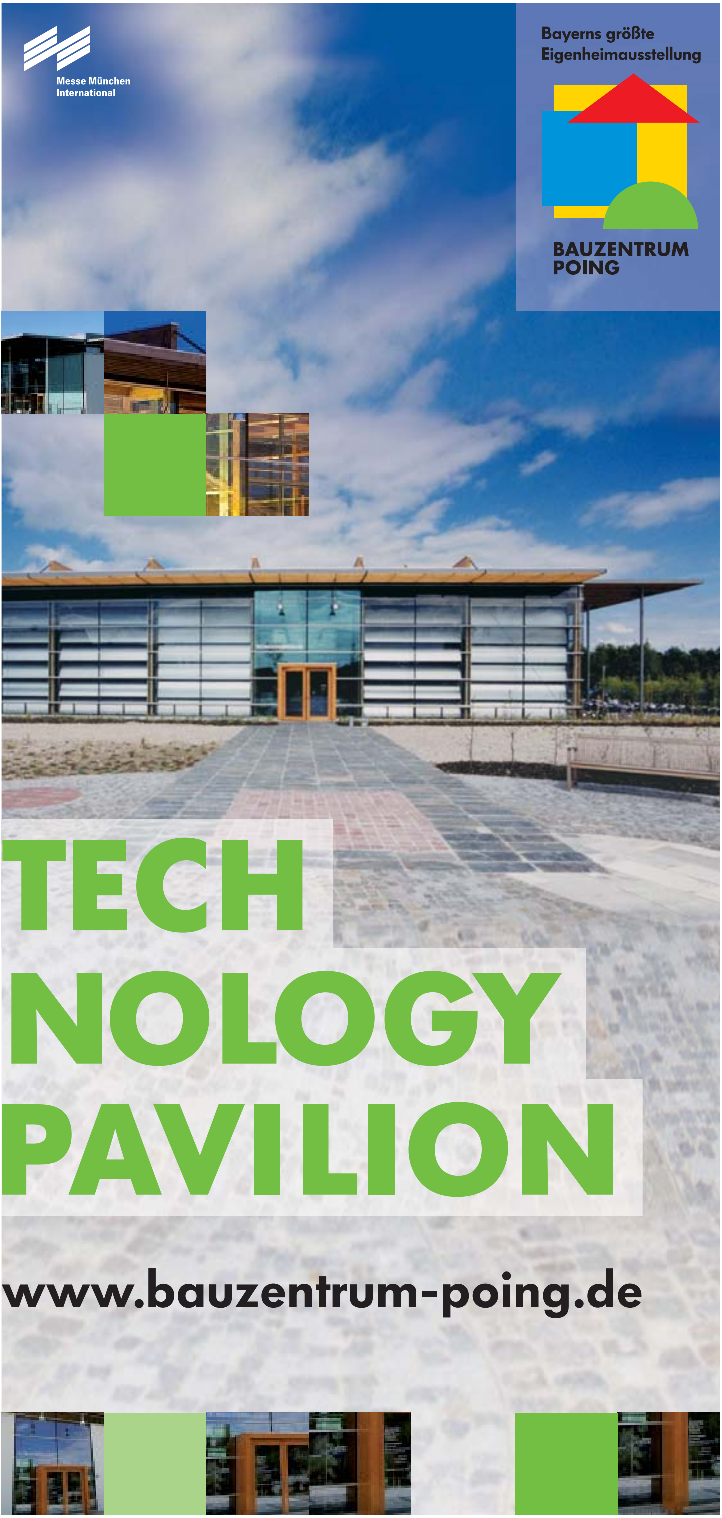
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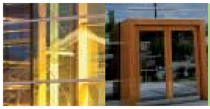
TECHNOLOGY PAVILION

With the Technology Pavilion in Poing, Messe München highlights the great potential inherent in intelligent architecture and technology.



ARCHITECTURAL PRINCIPLES

A striking characteristic is the compact architecture of the building. The architects deliberately abstained from designing too many different angles and extensions in order to achieve a favorable ratio of the building volume to its outer surface. This reduces heat emissions. The large conference and meeting hall behind the Southwest façade is a single-storey structure, while the adjoining rooms accommodating the engineering and administrative teams, offices and toilet facilities towards the northeast are arranged over two storeys.

The orientation of the high entrance hall towards the southwest and of the light-flooded cafeteria towards the south-east leads to a maximum utilization of the directly incident sunlight. The rotatable slats in the double façade allow for an immediate response to weather changes, and the energy supply can be controlled by the sun.
As a result of the highly insulating multiple-shell structures of the façade, the roof and the floor, the captured heat energy is kept inside the building for a long time. This heat energy can be evenly distributed within the building by means of the heating coils installed under the flooring.

ENERGETIC OVERALL CONCEPT

The architects and engineers have developed an overall energetic concept which is centrally controlled via a multitude of sensors in order to supply the pavilion with heat.

THE TECHNICAL EQUIPMENT

Equipment for heat and energy supply

Apart from passive construction measures for the utilization of solar energy, a combined system composed of thermal solar collectors on the roof, a long-term heat accumulator (aquifer) as well as two ground water pumps for the coverage during peak-load periods ensures that the Technology Pavilion is sufficiently supplied with heat.

The **vacuum tube collectors** used on the roof are highly efficient. The gained thermal energy is used for hot water requirements and is available to the heating circuit.

Excess heat is conducted to an external **aquifer storage system**. This is a long-term heat accumulator in the form of an extremely well insulated, double-shell water tank located below the ground surface. Its capacity amounts to 100 cubic metres of water. On sunny days, the excess heat energy is conducted to the tank using water as a medium (loading operation).
When the storage system is fully loaded, the water reaches a temperature of approximately 50 degrees Celsius. During wintertime, this process is inverted: hot water is withdrawn to warm up a floor heating. After cooling down, the heating water is redirected to the storage system. Thus, the water in the aquifer storage system cools down again to a minimum of 25 degrees Celsius.

If the energy demand exceeds the heat energy provided by the solar collectors and the long-term accumulator is discharged, two **ground water heat pumps** will be connected in addition. During summertime, the available ground water with its relatively constant temperature is used to **cool the building** (changeover system).
In addition to free ventilation via the double façade and the central building control system, there is a possibility to ensure the air quality of the pavilion by means of ventilation and air-conditioning systems depending on the utilization of the rooms.

For this purpose, HVAC systems with heat recovery have already been installed for the café, the toilet facilities, the kitchen area and the conference area. The systems are also connected to the changeover system and thus can be used for heating and cooling.

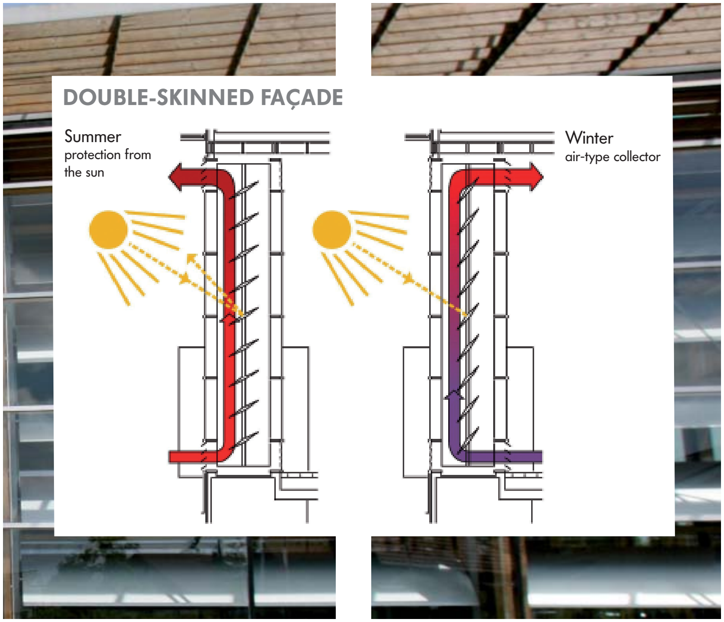
Cooling in the much more sophisticated HVAC device of the conference area is supported through **adiabatic evaporative cooling** using ground water. According to the principle of adiabatic evaporative cooling, the air cools down by taking up moisture. This effect is taken advantage of by spraying finely atomized water into the air. The system, however, does not moisten the air but the exhaust air. The cooling effect achieved there is conducted to the outside air through a plate heat exchanger. The cooled outside air is subsequently conducted into the building.

Vitreous double façade with solar wings:

SUN PROTECTION IN SUMMER, ABSORBER FUNCTION IN WINTER

The vitreous "double façade" towards the southeast consists of an outside single glazing and an inside thermal-protection glazing. Between these glass walls there is a 1.25 metre wide hollow space carrying the solar wings or rotatable slats. The upper and lower terminations of this solar wall are equipped with ventilation flaps that control the air streams. At low outside temperatures, the dark sides of the wings turn outwards. The sunlight hits the dark side of the mobile wings and warms up the air in the space in between. The inner ventilation flaps are open. As in a chimney, the warm air rises and penetrates the inside of the building via the upper ventilation flaps. The façade acts as a hot air collector. At high outside temperatures, the bright, sparkling silver wing sides turn outwards so as to reflect sunlight. The outer ventilation flaps are open to allow the heat to penetrate the inside of the building. Now the façade assumes a sun protection function.

Heat energy is also generated in the ground plate of the light-flooded rooms. The floor consists of a 12 centimetre thick dark-coloured pavement and lies on a massive ground plate which is thermally insulated from below through a 20 centimetre thick polystyrene layer. Incident sunlight warms the floor up like a collector. Coil pipes incorporated in the floor pavement distribute the gained heat within the building. On the other hand, they prevent that the building is overheated because the pipe system is responsible for both heating and cooling, which is called changeover operation by professionals. In the low-temperature heating mode, water with a maximum temperature of 35 degrees Celsius flows through the floor, while its minimum temperature is 12 degrees Celsius in the cooling mode.



ASPECTS OF THE BUILDING STRUCTURE

The architects avail themselves of three basic construction measures and materials:

1. **Transparent glass façades towards the southeast and the southwest let sunlight and thus thermal energy penetrate the building.**

2. **Heat-accumulating, massive walls inside the building help store and distribute the captured solar energy.**

3. **High-efficiency insulations below the floor, in the walls and in the roof structure contribute to a substantial reduction of heat losses from the building.**

BASIC DATA:

1st prize in the architectural competition on 28 July 1998

Start of construction:	June 1999
Completion:	May 2000
Floor space:	35 x 20 metres
Height:	7.20 metres

UTILIZATION

- Entrance building of the Building Centre in Poing with conference rooms and cafeteria
- Demonstration project for energy-saving, environmentally compatible building

TECHNOLOGY

- Double façade with rotatable slats
- Vacuum tube collectors
- Aquifer storage system
- Two ground water heat pumps
- Adiabatic evaporation cooling
- Solar façade made of cellulose combs
- Cistern for rain water utilization

ARCHITECTS

Kaup Scholz Jesse + Partner, Munich

ENGINEERS, HEATING, VENTILATION, AIR-CONDITIONING, REFRIGERATION

Schmidt Reuter Partner, Munich

ENGINEERS, STRUCTURAL DESIGN

Ingenieurbüro Tischner, Dachau

ADDRESS / CONTACT:

Bauzentrum Poing
Senator-Gerauer-Straße 25
85586 Poing / Grub
Tel.: (+49 89) 99 02 07-60/61
Fax: (+49 89) 99 02 07-62

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