



# A Symbiosis of Aesthetics and High Tech at Capricorn House in Düsseldorf



## Background

Large glass atriums, the striking style of the glass facade and the long, meandering form characterize the impressive outer profile of the new seven story, 150m long Capricorn House situated at the entrance to the Media Harbour in Düsseldorf. The total floor space of 43,000 m<sup>2</sup> provides room for offices, a cafe and underground parking for both building occupants and the public.

This is the second project in which the constructor, Capricorn Development, has synthesised high demands on both aesthetics and intelligent building automation. The result is a modern, eye-catching building with one of the most innovative and complex building automation systems to date.

## The Challenge

The driving motif behind the entire project was a low-energy building as the symbiosis of ecological efficiency and architectural aesthetics – a building that will continue to offer the most up-to-date convenience for operator and user throughout its entire life. In the life cycle of a building, the initial investment is approximately 30% of the total cost. The remaining 70% are costs that accrue during the rest of the building's operational use. Since a

large part of these are energy costs, optimal energy consumption was a key issue. Capricorn Development demanded that energy usage be kept to 65 cent /m<sup>2</sup> per month, a rate that is 20% below the EnEV regulations on energy saving. At the same time, the building needed to offer a comfortable working environment for its occupants as well as provide the flexibility needed to make future changes to office layout with minimal disturbance and cost.

## The Solution

In order to meet the high demands on energy savings, flexibility and comfort, a building management system based on LONWORKS technology was installed in the building. The LONWORKS network enables devices from different manufactures to communicate with each other for the optimal control of a building's lighting, HVAC, security, safety and other systems. With over 24,000 physical data points and LONWORKS components from 8 different vendors, Capricorn House is one of the most complex building automation projects undertaken to date. The system integrators, Syscontrol and GTS Control Systems, were awarded the contract to implement the system.

The building owners wanted a completely free floor plan and a high level of functionality at each of the building's axes that would allow changes to the floor layout to be carried out at any time and without any changes to the hardware installation. To achieve this, the floor plan was broken down into 1280 room axes based on the window areas and the entire building automation equipment was housed in the facade. No pillars and no central technology, this innovative solution enables tenants to partition areas within the building as they wish and to change the layout at any time with minimal disruption to day-to-day work.

It also offers the highest levels of comfort for occupants. A total of 1300 LONMARK certified TAC Xenta® 300 controllers are used to automatically control ventilation, heating, cooling, lighting, shading and heat

recovery at each axis (a further 80 TAC Xenta controllers are used for primary control units). This enables ambient conditions to be adjusted at each individual work space according to occupants' preferences. Work place comfort is increased further by the use of special artificial lighting for the evening hours that has a colouring similar to that of daylight.

Even the facade is intelligent. Each facade element contains a separate ventilation unit specially developed by Trox. The units are automatically controlled by the TAC Xenta 300 controllers and ensure that the offices are supplied with fresh air, which passes through a dust filter and is heated before being discharged into the rooms. To optimize energy consumption, a built-in recuperative heat unit uses heat energy from the extracted air to warm fresh air coming into the building.

Geothermal energy is also used for heating and cooling the building. Chillers from Trane ensure that the concrete floors and ceilings are supplied with either hot or cold water drawn from under the ground. 120 sensors monitor the temperature in the concrete core to ensure that the temperature is maintained at the desired level. Along with the Trox ventilation units, the use of geothermal energy forms part of the overall strategy for the intelligent control of energy consumption in the building. In Addition, weather data from the Internet is being used for the first time to generate future energy consumption trends. Temperature data for three days in advance is included in the overall energy strategy to enable not only just-in-time reactions, but also to generate forecasted, precise information, which is permanently monitored and actualised. Syscontrol and GTS developed a special program for the TAC Vista. The program generates reports which are transferred to each of the 1380 TAC Xenta controllers in order to ensure the most effective performance.

Another important contribution to the energy strategy are the 1300 sun-blinds from Warema. Mounted on the outside of the facade, the sun-blinds are automatically driven by motors located at the floor axes. A weather station from SVEA Building Control Systems on the roof of the building collects information about brightness, temperature, wind speed and wind direction and makes this information available on the LONWORKS network. The motors then use this information to drive the sun-blinds into the optimal position. Significant energy savings result when the blinds are used to supplement the overall heating and cooling strategy, using the sun tracking functionality. For example, during the winter months the blinds are automatically raised to allow the sun's rays to heat the building. In summer, the blinds are lowered to keep the rooms cool. Integrating the sun-blinds into the LONWORKS network also enables communication

with the building's other systems such as the fire alarm system. In the event of fire, all sun-blinds are automatically driven up or down to either allow smoke out of the building or to prevent areas from filling with smoke.

Segmenting the entire building automation system into smaller, independent parts guarantees the required system stability. The super-ordinate TAC Vista® building management system with several operator stations ensures that all information from the 24,000 data points is available at all times. Connection with the Internet gives operations and maintenance staff remote access to information which enables them to respond promptly and effectively to faults and problems. The TAC Vista® Facility Management System is used for the continuous monitoring and optimization of running costs. It consists of a suite of software modules linked to a central database and provides the information needed to manage and optimise the running of the building – everything from efficient maintenance planning to analysing and planning energy saving strategies.



### Summary

The harmonious combination of architecture and LONWORKS technology at Capricorn House has resulted in a flexible, energy efficient building that affords tenants the greatest freedom in structuring their working environment whilst providing the best possible ambient conditions for workers. With the on-going monitoring, analysis and optimization of energy consumption, the building is also set to meet the strict energy targets laid down by the building owners.

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