Harnessing nature
Energy-efficient office complex
Hyderabad, India

A new office complex on the outskirts of the Indian city of Hyderabad harnesses a resource the country is rich in, but which many architectural solutions have sought to escape in the past — the sun. In so doing, it manages to meet two seemingly conflicting objectives — to maximize shading as well as the use of daylight. The result is a significant reduction in energy consumption.

With seven offices worldwide, it is no surprise to learn the firm is active in India. SOM Director Mark Igou leads the firm’s practice in India and currently oversees the Hill County Special Economic Zone (SEZ) Office Complex project — a sustainable office complex in Hyderabad that sets new standards on the subcontinent. Mark Igou is a passionate ambassador for his work in India “The country just buzzes with life,” he explains.

New York-based Skidmore, Owings & Merrill (SOM) is one of the largest architecture firms in the world. They built the Sears Tower in Chicago, New York’s Time Warner Center and the world’s tallest building at a height of over 800, the Burj Dubai. The SOM design for One World Trade Center, the first office tower to rise on the World Trade Center site is also currently under construction.

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“The focus here is on development. It’s a rewarding experience because combined with a can-do attitude are rich traditions and a unique culture.” — Mark Igou

Global thinking, local action
Part of a global firm, Mark Igou has his feet firmly rooted in the soil where he works. “You can apply the old adage — think global, act local — to what we’re doing here,” he says. Although SOM is an international practice with global expertise, it also possesses a deep understanding of the cultural, environmental and political issues which are most relevant to India. “We can bring all this global thinking together to develop solutions which best suit local conditions.”

Collaborating with some of India’s foremost academics and research specialists to develop a meaningful understanding of local issues combined with the firm’s legacy of design and technical innovation delivers architecture seamlessly integrated to local conditions and needs,” Mark Igou explains.

The solution proposed by SOM for the Hill County Special Economic Zone (SEZ) office complex in Hyderabad is part of the company’s global Holcim Awards entry. It’s an opportunity for SOM to draw on its considerable design expertise to address a number of important local challenges.

Global Holcim Awards finalist 2009

Regional competition
Holcim Awards Bronze 2008 Asia Pacific; jury appraisal page 112
the outskirts of Hyderabad is a case in point. SEZs are government-backed export processing zones to fast-track economic development and foreign investment. Some 100 such zones already exist; a further 250 are in development. As well as designing an iconic building for Hill County’s developer, Maytas Properties, SOM are responsible for the zone’s overall master plan.

Enhancing the quality of life
The master plan takes into account local living and work practices together with an analysis of the current state of the region’s infrastructure. “People generally come to work by bus in India,” Mark Igou explains. “But the roads here don’t have the capacity to support all of the proposed development.” The SEZ, therefore, will only be able to function optimally if workers live in its vicinity – “otherwise they would be stuck in traffic chaos, which is neither economically nor environmentally sound.” The master plan envisions a mixed-use development programmed with public amenities such as parks, plazas and community centers. Living and recreational space for up to 30,000 people is anticipated. “Walk to work” is the tagline for the concept – and encouraged by an attractive streetscape design, higher quality of life is the goal.

Sustainable design in a contrary climate
Currently under construction, the Hill County SEZ Office Complex will house around 3,000 workers across 110,000 square meters of space in the IT and IT-enabled sector. Its intriguing design reduces energy consumption compared to the average Indian office building by 35-40%. This effectively reduces the building’s overall carbon emission, a concern emphasized by the government of India in 2007 when the Energy Conservation Building Code was established. The new office complex is on target to achieve LEED Gold rating, and promises to push for a new standard for sustainable design on the sub-continent. “This climate isn’t mild,” Mark Igou points out. “The sun can be relentless but an understanding of the harsh local climate informs the building’s numerous sustainable innovations.”

Natural or artificial lighting?
The SOM team had four objectives for the design concept: to reduce energy consumption, improve worker comfort, improve maintenance costs over the life of the building, and decrease reliance on public infrastructure. “All our objectives were in response to the situation, for example to improve worker comfort,” Mark Igou explains that in many IT company office
workspaces are cramped and there is little natural light. “To minimize direct sunlight turning the building into an oven, most offices have heavily tinted windows,” he says. The effect, however, is not just an issue of worker comfort – it means the energy balance is disturbed. By keeping sunlight out, office spaces must be artificially lit, and in India, this accounts for some 60% of all energy consumption. “The load this places on power infrastructure is massive, and growing,” Mark Igou explains. Outages are a common occurrence, disrupting work days and schedules, and a major problem for a country that wants to continue to grow. On the contrary, it contributes to decentralization and a desire to minimize reliance on government infrastructure. “We are developing our own sustainable solutions.” Strategies to increase both worker comfort and building performativity include interior courtyards and light wells, and exterior shading devices based on vernacular Indian architecture.

Connecting inside and out
The building’s design is energy-efficiency in action. For its own sake, and beyond. “Nature is not the enemy,” Mark Igou says. “We spend much of our lives disconnected from the real world – moving from our air-conditioned houses, to air-conditioned cars, to drive to air-conditioned offices.”

As a result, the SOM team challenged this paradigm by understanding climactic conditions and analysing design strategies that harness their potential. By harnessing the sun’s energy in their concept, they will reconnect those who work within with the wider world outside. Yet, the idea is not new. The concept originates from India’s ancient architectural philosophy Vastu Sastra which seeks to create harmony between the built environment and the five natural elements – earth, water, fire, air and space.

In SOM’s case this meant feeding a plethora of data concerning rainfall, wind direction, sun exposure and temperature into their computers. The modeled climatic conditions and analysis significantly informed the building’s overall design.

High impact, low-tech
The office complex is lean, and low-rise. It is constructed in two sections, connected by bridges. The layout is organized around a series of interior courtyards which allow sunlight to penetrate down into the building’s core – a solution which is optimized to harness the sun’s energy and decreases dependence on electrical lighting. In this way, the design successfully meets two seemingly conflicting objectives – to maximize shading as well as the use of daylight.

While this strategy is low-tech, the result for energy savings and building comfort are high-impact. The building works are contained in the north-west wings, where radiation levels are occupied by cores containing offices.
Passively and virtually green

The belief that cutting edge architectural design and energy efficiency cannot be combined is shattered by some contemporary office building designs. Skidmore, Owings and Merrill (SOM) completed China’s first zero-net energy building in terms of operating energy in 2010. The Pearl Spear facade captures wind to power building vents to help reduce dependence on conventional air conditioners. The building will also tap into sun, water aquifer, and other available natural resources. But here’s a design tested before the foundations are placed?

Passive energy design from computer-generated modeling is a big part of the solution. Indeed, buildings are modeled with solar orientation and shading coefficients built into their exteriors to keep out the summer heat. A few sunny days in winter interiors are plugged in by using computer modeling to heighten passive solar access. Maximum office productivity and thermal comfort are laid out by software to optimize energy efficient performance. Combined with geothermal heating and cooling design, and integrated active photovoltaics, the building achieves virtually green.

“Better atmosphere, less turnover”
Other contributions to the sustainable performance of the building focus on water use. Rainwater is harvested for irrigation and aquifer replenishment. On-site sewage treatment enables the processing and re-use of grey water for non-potable uses, including chilled water for air handling units. In addition, local materials and techniques are used in the construction of the complex. The design aims to ensure low maintenance costs over a long building life as well as being flexible enough to not require structural adjustments over time.

According to SOM’s calculations, the higher capital costs to realize construction will be amortized in two years by the reduced energy consumption. Mark Igou is pleased with the progress. “We have created a better atmosphere in which people can work,” he says. Higher employee satisfaction is a welcome by-product of improved working conditions. India’s IT industry experiences significant turnover rates, not least because of this reason.

Structure reflects the landscape
The complex takes full advantage of the contoured and rocky terrain, elevation as extensions of the contours themselves. A ribbon effect is created as the building is stepped up to the south – self-shading is the result. A washboard effect is created as the building is stepped up to the south – self-shading is the result. A washboard effect is created as the building is stepped up to the south – self-shading is the result.