



Built for efficiency

ABB's new manufacturing and logistics center in South Africa was designed to be green from top to bottom

CHESNEY BRADSHAW, PAULO DAVID – As one of the world's leading engineering companies, ABB is committed to helping its customers use electric power efficiently, increase industrial productivity and lower environmental impact in a sustainable way. In fact, the company's vision of power and productivity for a better world starts right in its own offices: ABB's new headquarters and manufacturing building for South Africa has taken on all these challenges, emerging as a technologically advanced, resource-efficient and energy-efficient workplace. The new building is helping ABB reduce environmental impact and lower operating costs.



Known as the ABB campus, the new high-tech facility is the manufacturing and logistics center for ABB in South Africa → 1. The building was planned and developed with a focus on design, construction and facilities management automation, resource efficiency, recycling and ongoing minimal environmental impact. ABB's goal was to create a building that would be a model of resource and energy efficiency and would have minimal impact on human health and the environment, reflecting the company's green building policy.

Approximately 18,000m² of the building is used as office space and 23,000m² is designated as a warehouse and factory. Completed in 2009, the facility now houses more than 1,000 employees, who had been working at four different sites in South Africa.

Building elements

The focus on energy efficiency is reflected in numerous different aspects of the

\$72 million (Rand 550 million) facility. It features key green building elements, including solar panels, a gray-water recycling system and energy-efficient lighting, and it also maximizes natural light in both the offices and the factory. The windows are coated with ultraviolet film and have louvers that create shade, which help reduce energy losses caused by the air conditioning. To further reduce the need for air conditioning, the building is insulated and ABB drives are used to maximize temperature control within the building together with the use of ABB's own high-efficiency ff1 motors and building management systems.

Attenuation tanks are used to irrigate the indigenous landscaped gardens.

The expectation of the building is that it will reduce energy consumption through the use of hot water solar heating, the

heat exchanger from air conditioning, the ff1 motors, the use of compact fluorescent lighting, the extensive use of gray water, and also by implementing ABB's building automation systems → 2.

Solar heating

A north-facing solar heating system on the roof of the building heats the water that is delivered to the showers. This free natural energy source also eliminates the

An impressive 80 percent of the energy for heating the building is provided through solar power.

need for electric heating and produces no carbon emissions. An impressive 80 percent of the energy for water heating is provided through solar power. Energy consumption for the heating system is also reduced through a heat



exchange system that uses hot air from the air-conditioning system to supplement the building's boilers. About 95 percent of all water heating is done via solar and heat recovery.

Water conservation

Another aspect of minimizing environmental impact is water conservation. All rainwater is collected from both of its roofs and the hardstands into an attenuation pond, which also adds aesthetic value. The factory roof and hardstand serve as a 40,000 m² catchment area; should a rainstorm deliver 100 mm of rain

on days it does not rain. A ball valve system automatically distributes this water.

Inside, water from the facility's showers and sinks is reused for flushing the toilets. This gray water is first collected, cleaned and recycled, and is then piped into the toilet reticulation systems. On average, 15 m³ of gray water is collected every day.

Building shape: form follows function

The design principle "form follows function" certainly played a role in the development of the ABB campus. Its H-shaped configuration helps reduce energy demand because the office workstations are located in the exterior portions of the building where they can receive ample natural light. The roof design of the factory has also achieved such savings by enabling good use of natural light.

Lighting

Each workstation is fitted with a photosensitive switch that turns the light on when people arrive and off when they depart. All lights are low energy, with 12 kV downlights and emergency lighting installed in all of the service areas. In the factory, low-energy compact fluorescent lights are fitted throughout. The power reticulation grid to the lights allows individual units within the factory to turn their lights on and off as needed.

Insulation and air conditioning

Another route to achieving greater energy efficiency is through climate control. The basement is open and was designed

as such for effective natural ventilation. Fans are fitted throughout and have CO₂ detection meters that will automatically turn on air extraction when the CO₂ level reaches a predetermined value. The fans and air-conditioning plant are driven by

The fans and air-conditioning plant are driven by low-energy, high-efficiency ABB variable-speed drives.

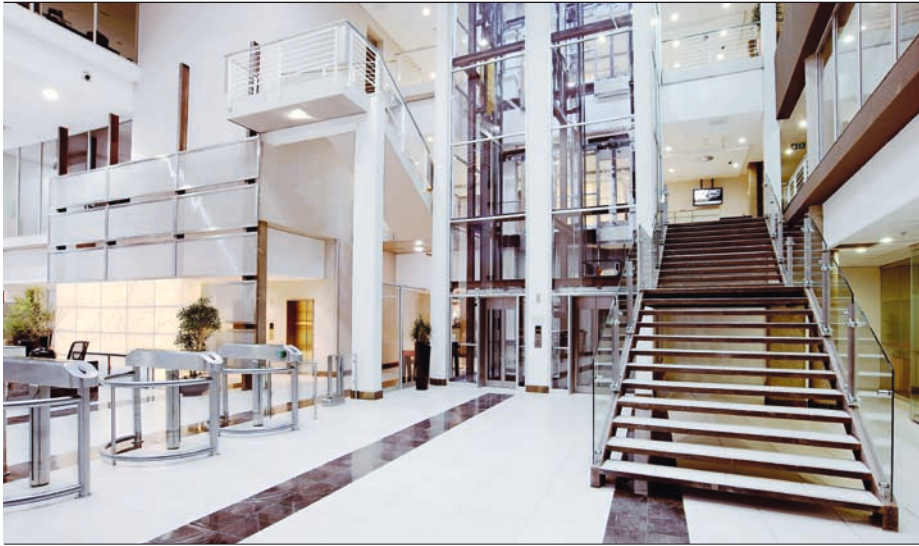
low-energy, high-efficiency ABB variable-speed drives, which use energy more efficiently and pick up speed in a slow, controlled manner that eliminates high power demand bursts at startup.

Temperatures in the basement in winter can be as low as 5 °C and therefore the office floors directly above are made from a 200 mm thick concrete slab that is insulated with a 100 mm Styrofoam layer, as are the side walls and the roof of the building. The insulation ensures that the air conditioning plant is 20 to 30 percent more efficient in maintaining the right temperature. With the installed insulation, cooling costs can be reduced by up to 8 percent in summer and heating costs can be reduced by up to 30 percent in winter.

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(as is quite common in South Africa), a total of 4,000 l of rainwater will be diverted into two attenuation ponds that feed the indigenous gardens. The ponds are kept full through a top-up feature, enabling the gardens to be watered even

2 The manufacturing and logistics center makes use of the latest technologies to achieve the greatest savings.



Building control

A building management system (BMS) has been integrated into the new facility, and is programmed to automate, control and manage all of the energy demands in the building with the result that the entire operation is as energy efficient as possible. The BMS provides a wide range of control functions, including fire control, security, power monitoring, and air-conditioning control. Variable-speed drives, or VSDs, provide infinite control over the speed of motors driving pumps and fans, maximizing the building's environment by matching the temperature and humidity to the demands of the prevailing weather and the number of occupants. VSDs also contribute greatly to energy savings – by controlling the speed of the motor such that it only runs at the speed needed, energy consumption can be controlled via the BMS. This results in significant cost

is created. A waste management plan was thus a necessity. The waste collection area and its management is outsourced to a waste management company. All waste is sorted, and paper, metal, glass and plastic are separated and removed for recycling. In keeping with the theme of reduced environmental impact, a company that uses environmentally friendly cleaning products is responsible for cleaning Longmeadow.

An award-winning facility

The Longmeadow building attains the highest green building standards and, in addition to its regular functions, serves as the perfect setting for an event centered on more efficient products and solutions.

The office building and factory was the venue for the November 2009 Automation and Power World Africa – the company's largest customer event in Africa. The new facility was officially opened by ABB Chief Executive Officer Joe Hogan as part of the proceedings. The Automation and Power World Event included an event greening program to make the event carbon neutral through a three-pronged approach.

- Implementing sustainable food and beverage procurement strategies, sustainable waste management, a green cleaning program and sustain-

able procurement strategies for conference materials.

- Monitoring and calculating carbon emissions from the event. Carbon emissions were calculated for the following impact areas: delegate travel to Johannesburg by air and road, delegate travel to and from the event by road, energy use in accommodation and energy use at the event venue.
- Offsetting the carbon emissions from the two-day event by purchasing carbon credits and supporting projects focused on sustainability and environmental awareness with sustainability partners WWF-SA (World Wild Fund for Nature in South Africa).

The building's energy saving efforts have not gone unnoticed. ABB in South Africa won a top energy-efficiency performer award in the industrial category of the eta energy efficiency awards sponsored by the utility Eskom and in association with the Department of Energy for its new building. The prestigious eta awards are granted in recognition of superior performance, creativity and innovation in energy efficiency. The award was one of three presented in the National Energy Accord category run by the National Business Initiative for outstanding performance in energy efficiency. The judges praised ABB for its energy-efficient building at Longmeadow, Johannesburg, and for the company's use of its own energy-efficient technologies as well as its lowered environmental impact. ABB also received a letter of congratulations from the National Energy Efficiency Agency of South Africa, commending the company for the lead that it has taken in energy efficiency specifically at its manufacturing and logistics center.

ABB won a prestigious top energy-efficiency performer award for its new manufacturing and logistics center building.

savings and also raises the building's green profile. Lower pump speeds extend mechanical life and reduce maintenance costs.

Waste management and cleaning

With a staff of over 1,000 employees, one can imagine the amount of trash that

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