

Case Study | Lighting Control Systems

Taipei Financial Centre
Taiwan



The Challenge: To design a lighting control system that can stand up to the architectural demands of the world's tallest building while weathering the unpredictable forces of nature.

It's not easy to become the tallest building in the world.

Topping out at a height of 508 metres, incorporating 101 floors and occupying an area of over 30,000 sq. metres, the Taipei Financial Centre even surpasses the famed Twin Petronas Towers in Kuala Lumpur. Located in Shi Fu Road, the centre of the newly developed Hsin Yi Area, the Taipei Financial Centre is a major landmark in the ongoing transformation of the old Taipei Train station area into a new business district. Officially named 'Taipei 101 Tower', the building has a seven-floor podium boasting major shopping mall complex and restaurants, five underground car park levels, office floors and an observation deck. Taipei 101 holds three of the World's Tallest Building titles: tallest to structural top, tallest to roof and highest occupied floor.

Taipei 101 Tower is one of the few skyscrapers in the world in which the design inspiration comes from traditional Chinese buildings. Divided into eight canted sections like a piece of bamboo, its external walls are embellished with a 'ruyi', a traditional Chinese symbol of fulfillment and content. A hundred and one floors is an auspicious symbol signifying that the building is more than perfect.



Due to the building's impressive height, the building structure is based on steel with only the lower five levels of the tower built using reinforced concrete. Exterior wall is glass curtain wall with double glazed heat reduction clear glass, and the base of the building is built using granite. In terms of the structural system, the "megacolumn" approach was adopted, which ensures the tower's integrity in earthquakes and typhoons. It is one of the few buildings in the world equipped with double-deck elevators, which are the fastest in the world, travelling upwards at 1008 metres/minute and downward at 610 meters/minute.

Litenet Corporation, the lighting control contractor and supplier for this project, chose Lutron's GRAFIK 6000™ processor to provide a centralised lighting system for the building. The Lutron GRAFIK 6000™ preset lighting control system is a first-of-its kind central control system that allows today's best-available lighting automation technologies to be easily customised. Lutron's lighting systems are deployed at the public podium, main lobby of the tower and the exterior of the tower - from the 25th floor to the top of the tower. The podium has seven stories with 14,480 sq. metres and encompasses the Taipei 101 Shopping Mall. The podium is enclosed by a 42-metre high glass dome that covers an indoor space of 2,865 sq.

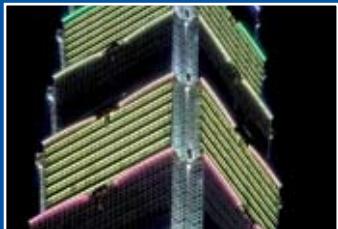
metres, which is one of the world's largest, and certainly Taipei's largest indoor public space where presentations, tradeshows and all sorts of social activities and performances take place.

The lighting of the building was designed in such a way that different lighting effects are created no matter whether it is viewed from any distance; moreover, it has to offer a high-tech impression. The lighting effect was established in such a way that, at a distance of 2 metres from the tower, fluorescent lights are useful for lighting up the vicinity; at 10 metres, it looks like a beautiful light tower and at 200 metres it gives an impression of a building that appears to touch the skyline.

The complexity of this project brings out the beauty of GRAFIK 6000™ preset lighting control system. Designed for optimal scalability, GRAFIK 6000's PC-based control allows full automation, where every aspect of lighting can be controlled through the main control centre located in the basement of the building or through remote control stations with PC jacks, allowing the user to simulate actual on-site atmosphere and receive feedback during scene setting.

The system has built-in lightning protection devices to prevent high altitude short-circuit problems and pre-programmed time clock functions that enables automatic lighting resetting in case of a power black out.

As the tallest building in the world, energy conservation is also on the top of the shopping list for the management of 'Taipei 101'. Lutron's systems can measure and monitor lighting system energy usage and peak demand, allowing facilities team to minimise energy charges.



The biggest challenge of the project is associated with ‘Mother Nature’, as Taiwan is located in an active earthquake zone with frequent typhoons during summer time. To alleviate wind pressure and to provide the best safety measures and efficient services, a mechanical floor is created with every eight floors of office, totaling 11 mechanical floors in the building. With maximum wind speed expected to be over 250 km per hour, the architect installed two wind dampers - a 680 ton swinging pendulum suspended from 89th floor, and another designed as a 15m high tower sitting atop the building. These dampers will reduce wind movement during a typhoon and automatically locks up when an earthquake hits.

Chris Liu of Litenet Corporation found Lutron extremely helpful when coping with the challenge. Lutron’s products are all lightning -strike protected, eliminating chances of short circuits; and the high durability of its products can withstand exposure on the exterior of the building where wind pressure is estimated to be above 250 km per hour.

Liu enjoyed using Lutron’s lighting systems, and considered them as the best in the market; he actually started using Lutron products 18 years ago and since then has adopted them in many key projects he undertook in Taiwan.

“Quality, innovation and user-friendliness are the three reasons I picked Lutron,” said Liu. “Lutron’s products have zero-defects, and its technology is constantly challenging the boundaries of the lighting market, while its user-friendly features allow anyone to master in a short time. For an important project like the Taipei Financial Centre, I wouldn’t trust any lighting control specialist other than Lutron.”



**Client**

Funded by several local private companies
PM/CM: Turner Steiner International SA

Architect

CY Lee and Partners

General Contractor

KTRT – joint venture of Kumagai

Main lighting contractor

Lancaster

Lighting control contractor

Litenet Corporation

Lutron Products

Lutron GRAFIK 6000™ Processor
23 GP Panels –
Dimmable distribution panel
8 XP Panels –
Switching distribution panel



Lutron Electronics Co., Inc.
7200 Suter Road
Coopersburg, PA 18036-1299
www.lutron.com

Lutron GL Ltd.,
Unit 2808, 28/F, MLC Tower,
248, Queen's Road,
Wanchai,
Hong Kong
www.lutron.com/asia



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