

**Building Name: Defence Technology Tower A**

**Address: 1 Depot Road, Singapore 109679**

Energy efficiency systems may not have been common a decade ago, but they already featured prominently in facilities designed and built in accordance with the MINDEF Infrastructure Guide (MIG) then. The Defence Technology Tower A (DTTA) is one such building that has energy efficient systems installed to ensure low energy usage. Completed in 1994, the 25-storey office building incorporates architectural considerations as well as efficient air-conditioning and lighting systems to manage energy consumption.



## **ARCHITECTURAL CONSIDERATIONS**

DTTA is orientated in the north-south direction to prevent its main facades from being exposed to the low and scorching western and eastern sunlight. On the eastern and western ends of building are the utility areas such as staircases and toilets which are not air-conditioned. At these ends, the facades of the tower have claddings with insulated metal panels. All these considerations help to reduce significantly the heat load into the building and save energy cost in air-conditioning.

In addition, the other facades of the Tower are mainly fitted with glass and aluminium

curtain walls. The glass areas are heavily tinted and double glazed to reduce the heat radiation entering the building. The aluminium portion of the curtain is extended from each floor level to each window level and is insulated. Furthermore, wire management cabinets (also with height from floor to window) are located behind the curtain wall all around the building's perimeter. They provide excellent heat insulation to the building besides functioning as effective service ducts.

## **AIR-CONDITIONING AND VENTILATION SYSTEM**

To ensure efficient operation of the air-conditioning system, DTTA uses an intelligent Building Management System (BMS) system to control the air-conditioning and ventilation systems.

For the entire building's air conditioning, DTTA uses a centralised water-cooled chilled water system. This system was chosen over the less efficient stand-alone direct-expansion unit. The chillers are controlled using load demand calculations by BMS. During rainy days when the cooling load is reduced due to lower ambient temperatures, the BMS would determine if it is necessary to operate the additional chiller. Also in accordance with the MIG, the temperature has been set at around 24 degree Celsius.

In maintaining high efficiency of energy, ventilation plays an important part too. To improve indoor air quality, fresh air is introduced into the building via primary air handling units. The primary air handling units treat the fresh air through a charcoal filter. This results in pressurising the building, hence preventing air leakage into building while maintaining good indoor air quality.

An all-air variable-air-volume system serves the whole building. Supply air from the air-handling unit is modulated by a variable speed drive which tracks the supply duct static pressure and saves energy when the demand is low. The air-handling units are

controlled using timer controls to ensure unnecessary operation of air-conditioning after office hours.

## **LIGHTING**

As for lights, DTTA uses low-energy electronic ballast, which saves about 10 to 15% in energy consumption. This also reduces the heat load on the air-conditioning system.. To optimise day light for the carpark lighting, photocell is installed..

Motion detectors have also been installed in conference rooms, meeting rooms, toilets and isolated corridors to control lighting to save energy when not in use. DSTA is one of the early users of such technology to save energy. . In addition, lighting-timer controls have been installed to switch off lights in designated areas after office hours and separately, staff have also been briefed to switch off office lights which are not in use.

As principal planner, designer, developer and construction manager of MINDEF's facilities, the Defence Science and Technology Agency (DSTA) updates the MINDEF Infrastructure Guide annually, with energy efficiency being a key emphasis. DSTA has consistently been recognised for its focus on novel `green' features and for being environmentally friendly. It won the ASEAN Best Practices Competition for Energy Efficient Buildings (Special Submission Category) of the ASEAN Energy Awards 2002 for harnessing cutting-edge technology in the designing, integration and implementation of two unique systems at Changi Naval Base - the Indirect Seawater Cooling and Thermal Ice Storage Systems. This award followed DSTA's winning of the inaugural Energy Efficient Building Award (Special Features Category) by the Building and Construction Authority of Singapore, in April 2002.