World SB08 Melbourne

KAJIMA Akasaka Annex, Tokyo

The KAJIMA Akasaka Annex is an office building constructed adjacent to the existing KI Building in July 2007. The technical divisions of KAJIMA Corporation, including civil engineering, architectural, design, development, and engineering divisions, are centrally arranged in these two buildings. This promotes interdepartmental communications and strengthens cross-organizational activities.

Composition of the two buildings

The Annex houses offices on the 1st to 9th floors and premium rental apartments on the 10th to 15th floors. Because of the elevation difference in the site, the 1st floor of the Annex is connected to the 4th floor of KI Building by a corridor to function integrally.
The standard floors of the Annex are of 77 m by 26 m compact shape, forming an open office as a single space, except for some meeting rooms. The office space is comfortable and efficient where office workers can see the entire office space and look out the windows for a view of the city from all seats.

Key design concept

The existing KI Building was built in 1989 under the design concept of addressing the needs for the highly advanced information society and providing amenities for room environments.
Additionally, to reflect the recent social conditions, flexibility, sustainability, and safety were chosen as the key design concepts of the new Annex.

Flexibility

The challenge for KAJIMA was to flexibly address the rapid social and technological changes. In response to this challenge, large column-free office spaces were designed, equipment functions were grouped into each 6.4 m by 6.4 m module, and spare spaces were prepared for future enhancement of equipment. This allows flexible organizational operation for many years to come.

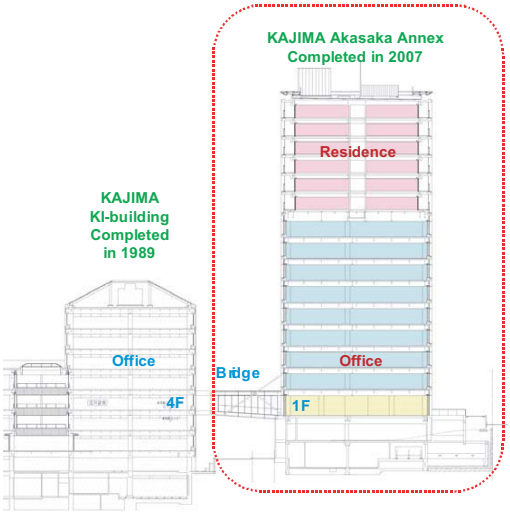
Sustainability

To meet the increasing social needs for sustainable design, the building serves as a model building for our customers. This building employs advanced and practical technologies that can be used for tenant buildings as well. Further, the building aims to not only save energy but also improve both the comfort and intellectual productivity of occupants.

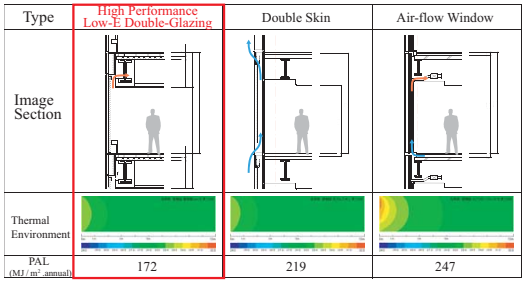
Building Type / Use :	New Office (respartially residence)
Country :	Japan
Client :	KAJIMA corporation
Architect :	KAJIMA design
Occupation :	August 2007
Site area :	5,067 m² (54,600 ft²)
Floor space :	33,517 m² (361,000 ft²)
Construction :	SRC+RC, 15F+B2F

Open Office

Standard Floor Plan

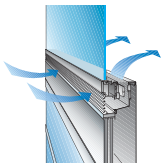


Building Composition



Facade Engineering

Facade



Ventilator Inlet

Safety

The important design concept as a construction company is to ensure basic functions even after earthquakes to maintain our service functions to our customers. In order to embody the concept, the earthquake resistance of the building is enhanced and an emergency control system was adopted to safely stop the elevators and equipment in a preventive manner based on the earthquake prediction information transmitted from the Japan Meteorological Agency.

Facade engineering

The simple and sturdy facade design, which expresses our corporate identity, has been adopted to our company' s buildings. The basic design is composed of white lattice-like arrangement of columns and beams and grey windows, creating sharply-chiseled features.
Regarding this basic facade design, large windows were adopted for the Annex to improve a sense of openness. At the same time, high-performance glass was adopted to save energy and improve thermal environments. (U value = 1.8 W/m2.K, shading coefficient SC = 0.29)
The right figure shows the analysis results of a performance evaluation simulation on the windows and perimeters of our advanced design. The energy-saving performance and thermal environments comparable to or better than that of the facade with special mechanisms, such as air flow windows and double skins, were achieved by adopting of high-performance glass that uses relatively dark grey heat-absorbing glass and low-e glass in combination.Additionally, air inlets were integrated with part of window sashes to provide natural ventilation of the building.

Sustainability features

The equipment system that was adopted for this building to realize the high environmental performance, the comfort and intellectual productivity of occupants and flexibility is collectively called "Eco Module." The office was divided into 6.4 m by 6.4 m modules and each module is provided with the following technologies.

- Task & ambient air-conditioning and lighting
- Free address hybrid sensor
- Universal Comfort
- Lighting control by occupancy sensor
- Optimum control for blind and lighting
- Hybrid air-conditioning

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KAJIMA CORPORATION

Email:Masaaki@kajima.com

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Task and ambient air-conditioning system

Task and ambient air-conditioning system is based on the concept of air-conditioning on demand, i.e., air-conditioning only the necessary areas. As shown in the figure, the system adopted for this building consists of an ambient air conditioner that softly air-conditions the entire room and treats and supplies the outside air and a task air conditioner that was laid out in each module. The system allows the office workers to control the temperatures from their seats according to their preferences using the task air conditioner, while the ambient air conditioner cools the entire room to 28°C, for example.

Free address hybrid sensor

Free address hybrid sensor was provided in each module in the office space. This sensor consists of 3 sensors.

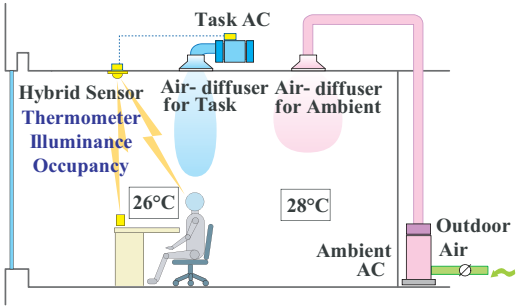
- The illuminance sensor detects the light intensity in the room and automatically controls the illuminance of lights to save energy by using daylight and correcting initial light intensity.
- The occupancy sensor detects non-occupancy in the room and switches off the lights and air conditioners to prevent wasteful energy consumption.
- The wireless remote thermometer detects the temperatures at the locations close to the persons and transmits the information to the free address hybrid sensor. This allows the optimum control of the task air conditioners.

Universal Comfort

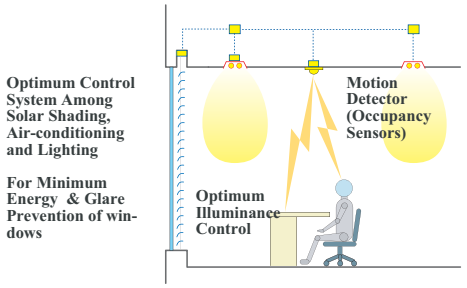
To enhance the functions of the task air conditioners, an air diffuser with new functions, called Universal Comfort, was developed. This air diffuser allows free switching between the mode of making the occupants feel moderate air flows according to their preferences and the mode of diffusing air flows so as not to make the occupants feel the air flows. The Cool Biz campaign, or a voluntary energy-saving effort, is conducted in the summer in Japan to raise the air conditioner temperature setting to 28 ° C by encouraging the office workers to wear cool clothes. On this occasion, the former mode is effective.

Lighting control by occupancy sensor

Detecting the absence of people in a room with the occupancy sensor and turning off the lights in the room is very effective at saving energy but the uneven light intensities and dimness in the room often make occupants uncomfortable. In this building, we care for human comfort; the conditions of all modules are comprehensively judged to gradually decrease the light intensities without turning off the lights in the modules directly adjacent to occupied modules.



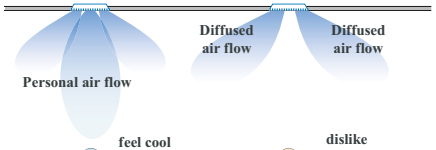
Task and Ambient Air-conditioning System



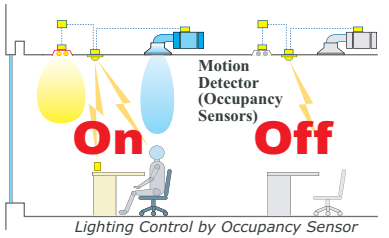
Optimum Control for Blind and Lighting

Hybrid Sensor

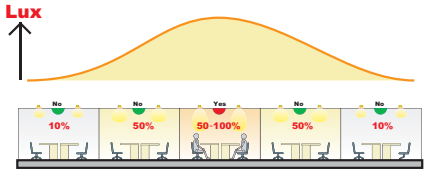
Wireless Remote Thermometer



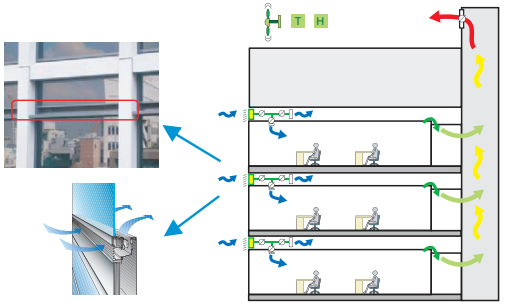
Universal Comfort



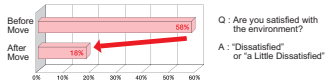
Lighting Control by Occupancy Sensor



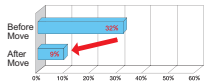
Gradual Decreasement



Natural Ventilation

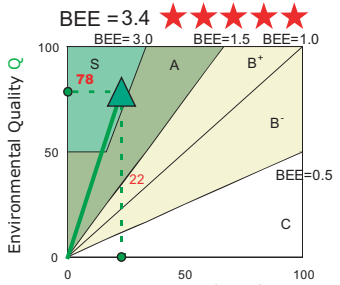


Dissatisfied Ratio About Thermal Environment



Dissatisfied Ratio About Air Quality

Result of the Questionnaire to Workers



CASBEE Assessment Results

Optimum control for blind and lighting

Introducing as much sun rays as possible is effective at reducing lighting energy consumption, whereas the sun rays need to be blocked as much as possible to reduce air-conditioning loads. To meet these contradictory requirements, a system of optimally controlling blinds was adopted for this building.

Hybrid air-conditioning

The air-conditioning system that uses natural ventilation in combination is called a hybrid air-conditioning system. The building builds a mechanism of taking the outside air into some window sashes and discharging the air from the top of the staircase to make the staircase function as the tower of wind for stable natural ventilation using air buoyancy. To respond to the wide-ranging outside air temperatures, two methods of natural ventilation are prepared, one is the method of introducing the outside air directly into the perimeter of rooms and the other is the method of introducing the outside air indirectly through ceiling plenums.

Performances and evaluation results

A questionnaire survey was conducted for the occupants of the Annex as to the environments before and after the relocation. The survey results indicate a significant decrease in the ratio of respondents who were dissatisfied (including slightly dissatisfied) with indoor thermal and air environments.

About 30% of the energy consumed in the ordinary office buildings can be saved by adopting the same energy-saving technologies mentioned earlier for this building.

The building is given the highest rank, Class S, of the Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) that is used widely in Japan.

Conclusion

This building employs practical energy-saving technologies within the limited cost range by taking an experimental approach for this construction company's own building while maintaining the simple and sturdy posture of the company. The technologies adopted for this building can also be adopted for ordinary office buildings in smaller scales and extended over a large area in the future.

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KAJIMA CORPORATION

Email:Masaaki@kajima.com