

# Green Technologies of Elevators & Escalators



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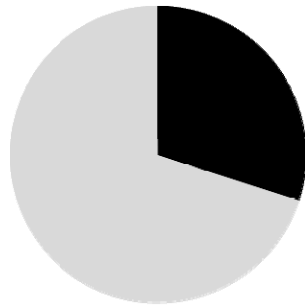
# Company Profile



**MITSUBISHI ELEVATOR  
(THAILAND) CO., LTD.**

*Change for the Better*

# WHY MITSUBISHI ?



30% market share



Over 800 employees



Over 800  
nominated  
Sub-contractor  
mechanics



The most equipped  
Training Center



Over 20000  
accumulated sales



Over 80% customers in  
service contract



28 service centers  
Nationwide and continuing

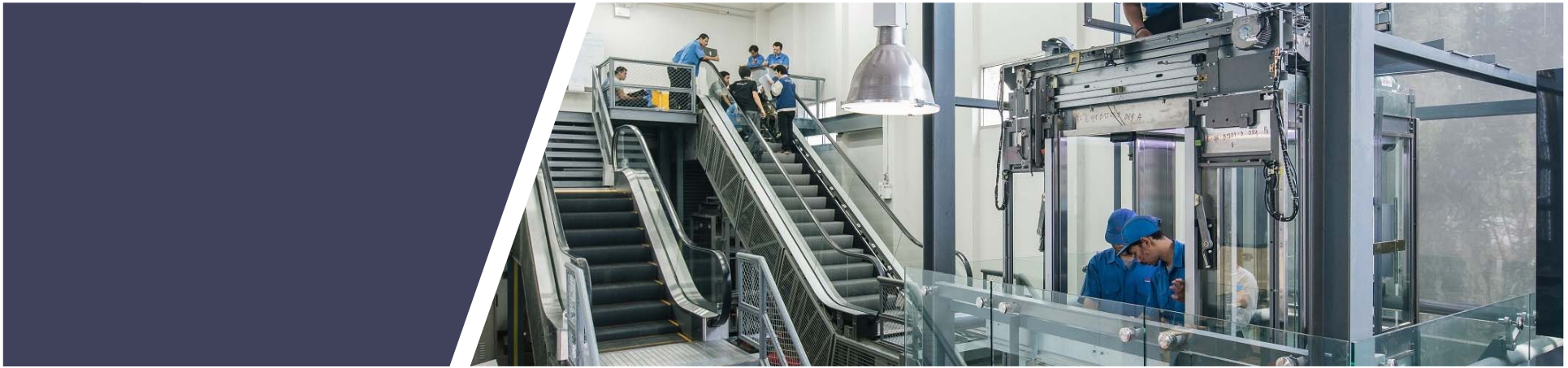
# TRAINING CENTER MITSUBISHI ELEVATOR (THAILAND)

*The fully-equipped  
vertical transportation  
in Thailand*



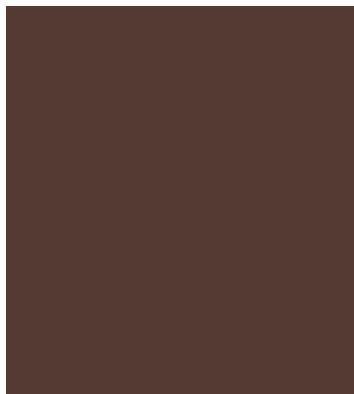
# TRAINING CENTER





# TRAINING PROGRAM

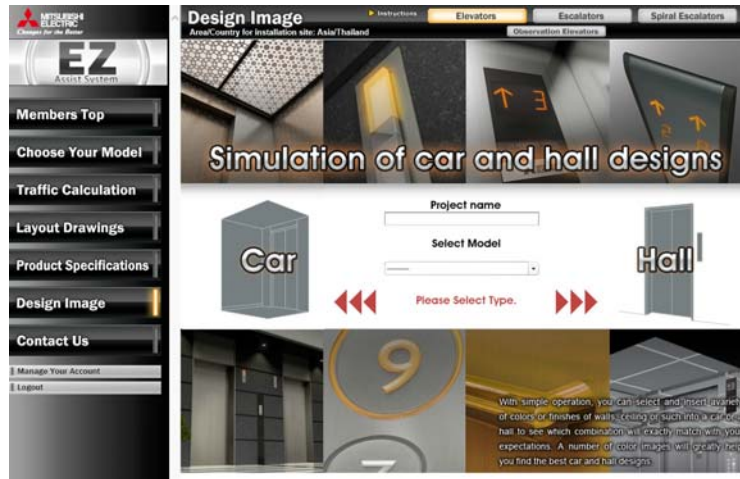
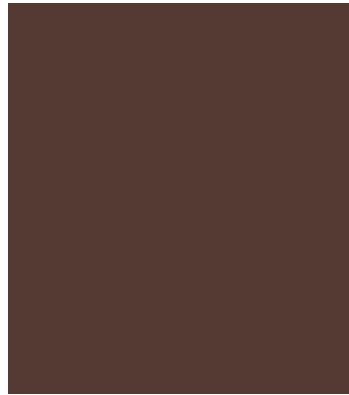




# SHOW ROOM

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Simulation Design



# Design Image

VR Design Image





We are **The No.1** Elevators Service & Maintenance in Thailand



**28** Service Centers  
And counting

# SERVICE CENTERS

Bangkok	Upcountry
<ul style="list-style-type: none"><li>• Bangna</li><li>• Silom</li><li>• Sukhumvit</li><li>• Ladprao</li><li>• Rama 3</li><li>• Pinklao</li><li>• Phahonyothin</li><li>• Donmuang</li><li>• Bangkapi</li><li>• Ploenjit</li><li>• Udomsuk</li><li>• Ratchadapisek</li></ul>	<ul style="list-style-type: none"><li>• Phuket</li><li>• Pattaya</li><li>• Chiang Mai</li><li>• Hua Hin</li><li>• Udon Thani</li><li>• Surat Thani</li><li>• Hat Yai</li><li>• Phitsanulok</li><li>• Khon Kaen</li><li>• Chonburi</li><li>• Ubon Rachathani</li><li>• Nakhonpathom</li><li>• Nakhon Ratchasima</li><li>• Chiang Rai</li><li>• Nonthaburi</li><li>• Rayong</li></ul>



# OUR CERTIFICATES

We are **The Best** Elevators Quality & Safety in Thailand



**ISO 14001:2015**

Environment  
Management system

**ISO 9001:2015**

Quality  
Management system

**OHSAS 18001:2017**

Occupational health  
and safety  
Management system

**Mitsubishi is accredited by respected international agencies.**

# Green Technologies



**MITSUBISHI ELEVATOR  
(THAILAND) CO., LTD.**

*Change for the Better*

# We strive to be green in all of our business activities.

We take every action to reduce environmental burden during each process of our elevators' and escalators' lifecycle.



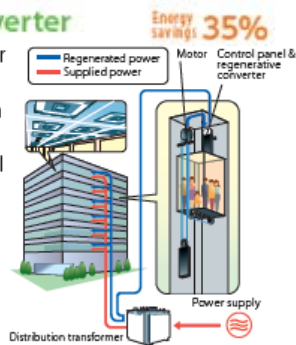


# Eco Products

## Energy Savings

### Regenerative Converter

The Regenerative Converter transmits the power regenerated by the traction machine via distribution transformer to the electrical network in the building.

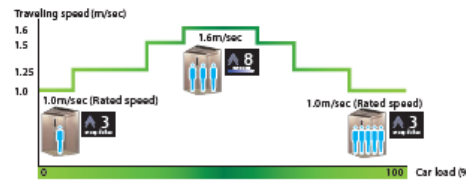


Mitsubishi Electric original

Traffic improvement without increasing power-supply capacity **15%**

### Variable traveling speed elevator system

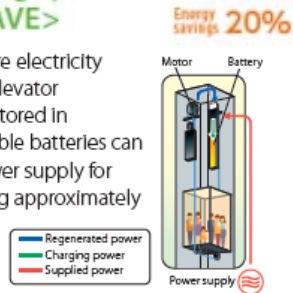
This system allows elevators to travel faster than their rated speed depending on the number of passengers in the car, thereby improving transport efficiency.



Mitsubishi Electric original

### Electricity recycling system for elevators <ELESAVE>

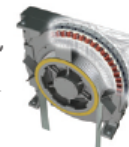
ELESAVE is designed to store electricity generated during regular elevator operations. The electricity stored in nickel-hydrogen rechargeable batteries can be used as an auxiliary power supply for running elevators, providing approximately 20% power savings.



Mitsubishi Electric original

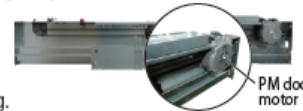
### PM motor with joint-lapped stator

With the joint-lapped motor in traction machines, the iron core is split like a hinge, which allows coils to be wound around the core more densely, resulting in greater motor efficiency and compactness.



### Permanent magnet (PM) door motor

The direct-drive PM door motor and the VVVF inverter realize efficient door opening and closing.



### Car light/fan shut off

The car lighting and ventilation fan are automatically turned off if there are no calls for a specific period.

### LED lighting

Energy-efficient and long-life LEDs are used for car lighting in elevators and under-handrail lighting on escalators.



## Materials

### Less oil

The guide shoe and rope require only minimal oil, significantly reducing environmental impact.

### Size and weight-saving

The size and weight of doors, cars, car frames, rails and some other components have been reduced based on test analysis of their shock-absorption performance.



## Eco Products

### Traffic Efficiency

**Σ AI group control system** Traffic improvement without increasing power consumption **20%**

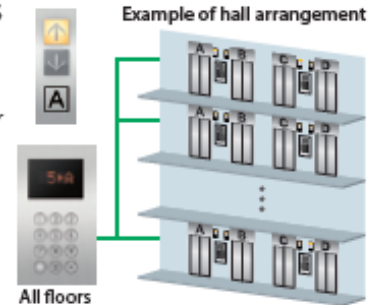
Effective control of multiple elevators reduces energy consumption.

**Energy-saving operation** Energy savings **10%**  
**Smart control technology**

According to each car's location and passenger load, the group control system assigns a call to the elevator that best balances operational efficiency and energy consumption.

### Destination oriented prediction system (DOAS)

When a passenger enters a destination floor at a hall, the hall operating panel indicates which car will serve the floor.



### Automatic operation

Our newly-developed, innovative escalator inverter enables a unique way of controlling the escalator speed in Automatic and Variable-Speed Operations.



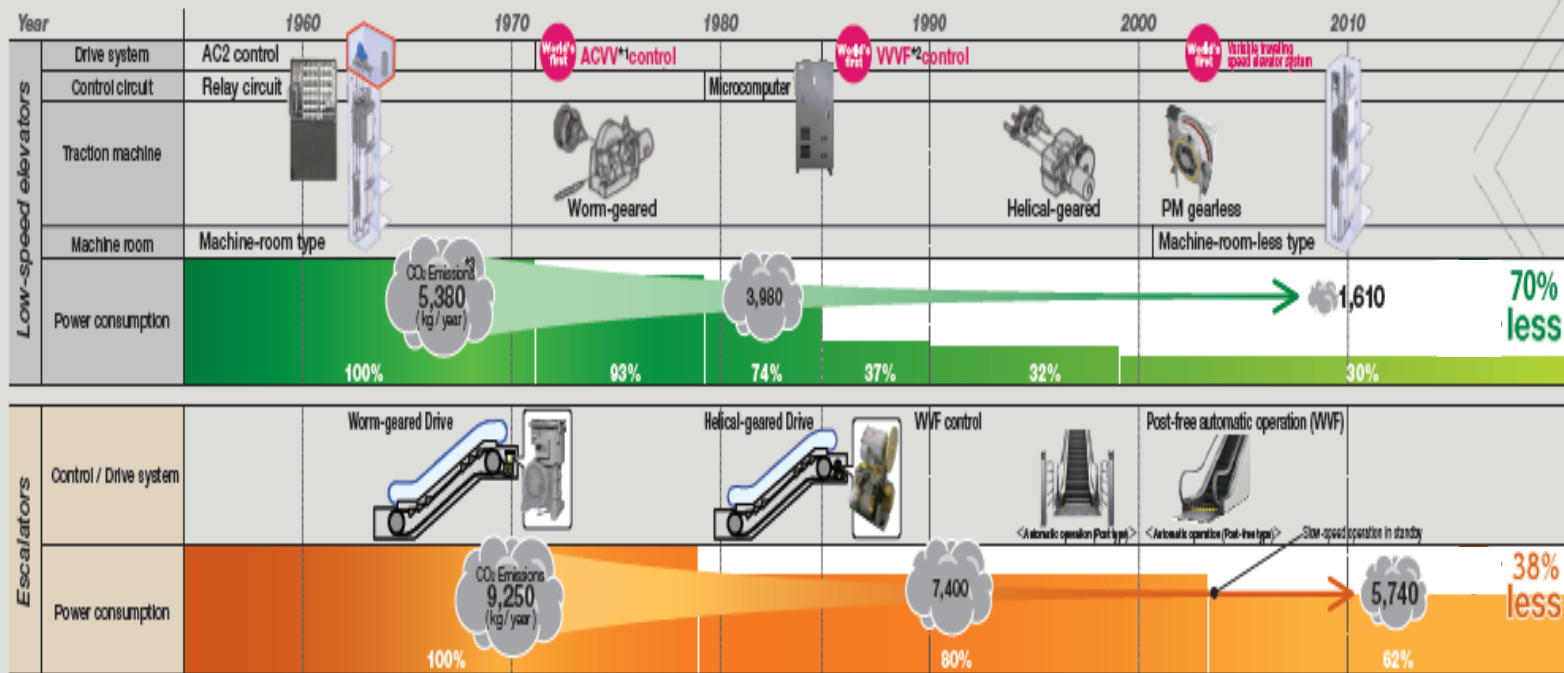




# Eco Products

## Milestones of Energy-saving Technologies

\*1: Alternative current variable voltage    \*2: Variable voltage, variable frequency  
 \*3: These values are estimated based on the latest CO<sub>2</sub> emissions.



CO<sub>2</sub> emissions : Calculated from the power consumption with coefficient of 0.6 kg/kWh.



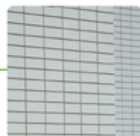


# Eco Factory

**Elevator testing tower – SOLAÉ –**  
 [ INAZAWA works ]



**Ventilation tunnels**  
 Large voids (ventilation tunnels) allow the tower to breathe fresh air through window louvers, ventilating the tower and cooling off the indoor temperature.



**Photocatalytic tiles**  
 Photocatalytic tiles on the outer walls resist and decompose dirt and even bacteria, helping reduce the use of cleaner.

**Rooftop garden (5,537 m<sup>2</sup>)**  
 [ INAZAWA works ]

The garden on the factory building shields from heat and improves air conditioning efficiency.



**High efficiency ceiling lights**

Old lights were replaced by high-frequency inverter lights, as the illuminance sensors help optimize the use of natural light and save 270,000 kWh of electricity per year.



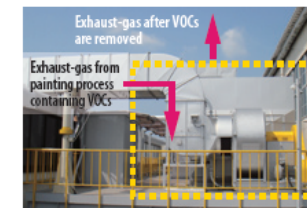
High-frequency inverter lights



Illuminance sensor (MELSAVE)

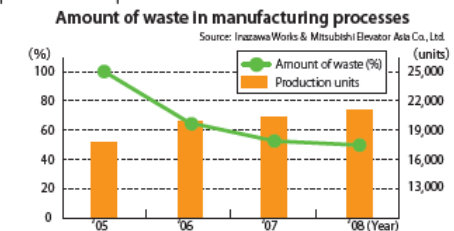
**VOC\* removal system**

A VOC removal system was installed. It not only eliminates approximately 93% of the VOCs, it also deodorizes the gases emitted. As a result, the deodorizing furnace is no longer required, which ultimately reduces the natural gas consumed by Inazawa Works. \* VOC: volatile organic compound



**Waste reduction**

We have reduced waste in our manufacturing processes to protect the environment.



**ISO 14001 certification**

Mitsubishi Electric's products, comprising the world's leading elevator and escalator technologies, are now manufactured in nine countries and regions, and sold in 88 countries. Since the achievement of ISO 14001 certification at the Inazawa Works, other overseas manufacturing plants and affiliated companies in Japan have also been certified.





## Logistics

### Reduction in wood consumption for packing (3Rs – reduce, reuse, recycle)

By reusing wood from crates, Mitsubishi Electric reduced wood consumption by 240 m<sup>3</sup> per year.



Returned wood



Sorted

The packaging for small parts of escalator trusses was changed from wooden crates to cardboard boxes, which reduced wood consumption by 69 m<sup>3</sup> per year.



Before: 0.078 m<sup>3</sup>/box



After: 0.037 m<sup>3</sup>/box

### Increasing load capacity to reduce the number of trucks used

We formulated guidelines on how to stack multiple containers or crates depending on their shape to improve load capacity. These efforts reduced the number of trucks used, and CO<sub>2</sub> emissions accordingly.



Fewer trucks



Before: single-stack



After: triple-stack



## Installation / Maintenance

### Development of installation engineering

In order to reduce the time and energy required for installation, installation equipment was made smaller and lighter. Mitsubishi Electric developed its installation method and equipment to have less impact on the environment.

#### 【 WOS method 】

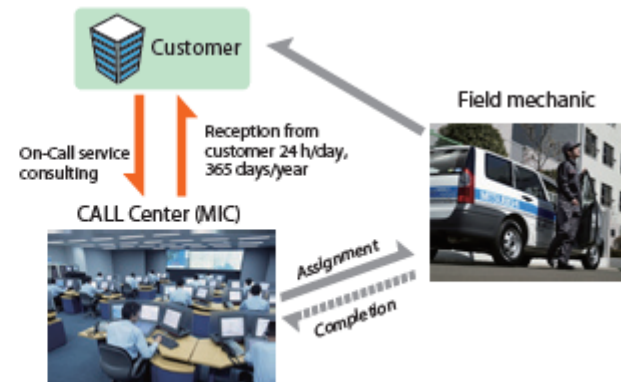
(Without-scaffolding installation method)

An elevator is installed by using the elevator's car platform, instead of scaffolding. It can eliminate the time for installation and removal of scaffolding.



### High-performance maintenance service

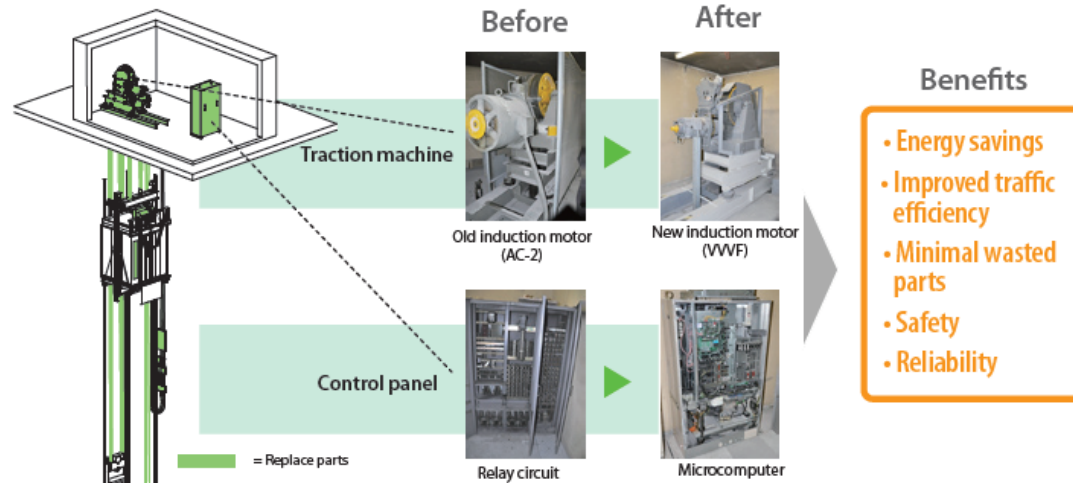
Monitoring each elevator's condition at the central control center, we provide efficient and reliable service without wasting energy.



# Modernization

## Proposing the most suitable solution

Modernization allows an elevator to be refurbished by replacing some of its components so that usable components can be retained.



	Existing elevators	Modernization: Case A	Modernization: Case B
Replaced components	—	Control panel (VVVF) Door motor Signal fixture	Traction machine & traction motor (Gearless) Control panel (VVVF) Door motor Signal fixture
Energy-saving	100%	62% → 38% cut	54% → 46% cut
Reuse rate	100%	88%	71%

## Environmental Vision 2021



Environmental Vision 2021 is the long-term environmental management vision of the Mitsubishi Electric Group. It establishes a framework for realizing a sustainable planet, and defines long-term initiatives to prevent global warming and to create a recycling-based society.



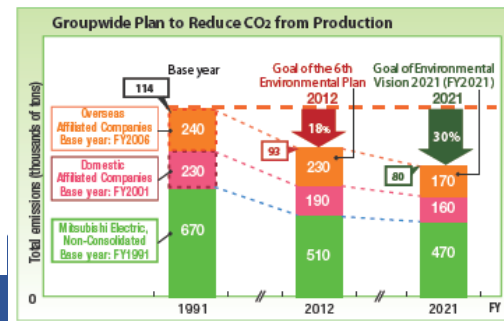
**Aim to Reduce CO<sub>2</sub> Emissions from Product Usage by 30%**  
 Prevent global warming by delivering energy-saving products



## Initiatives to Prevent Global Warming

**Aim to Reduce Total CO<sub>2</sub> Emissions from Production by 30%**

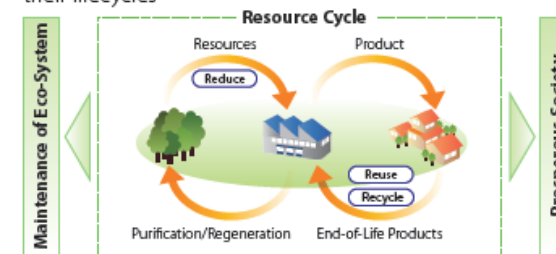
Raising the efficiency and performance of air conditioning, lighting and other utility equipment, as well as improving production lines reduces the amount of CO<sub>2</sub> emitted during production and helps prevent global warming.



## Initiatives to Achieve a Recycling-based Society

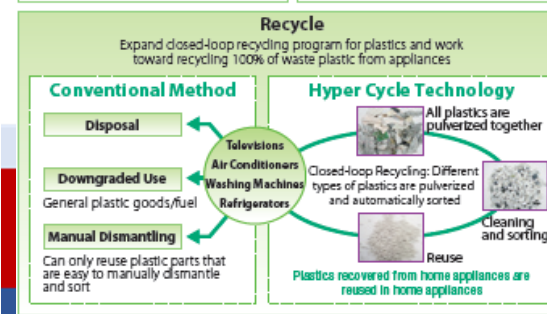
**The 3Rs:**  
 Reduce, Reuse and Recycle Products Utilizing 'Design for Environment' and 'Life Cycle Assessment' Technologies

Produce products that incorporate the 3Rs throughout their lifecycles



**Zero Emissions:**  
 Measures to Reduce the Direct Landfill of Waste to Zero

Restricting generation of waste and promoting the efficient reuse and re-resourcing of waste



# THANK YOU

FOR YOUR ATTENTION

