

Good-Standing Factories in Energy Control
Improvement Case Examples
Japan

Factories that were awarded by
the Secretary of State for Trade and Industry-Director
and General of the Agency of Natural Resources and Energy.

(1998 Electric Category : 19 Case Examples)

April, 1999

National Electricity Saving Committee

Good-Standing Factories in Energy Control in 1998

Electric Category : List of Awarded Factories

(1) Secretary of State for Trade and Industry-Director (5 Cases)

(by Area)

Area	Company	Industry
Tohoku District	Tohoku NEC Corporation	Manufacturer of Electric Machinery and Equipment
Chubu District	Sony Koda Corporation	Manufacturer of Electric Machinery and Equipment
Kinki District	Osaka Gas Co., Ltd.	Gas Provider
Chugoku District	Seibu Oil Co., Ltd Yamaguchi Oil Factory	Manufacturer of Petroleum and Coal Products
Kyushu District	Miyazaki Tourist Hotel	Accommodation¥

(2) General of the Agency of Natural Resources and Energy (14 Cases)

(by Area)

Area	Company	Industry
Tohoku District	Tohoku Paper Industry Co., Ltd	Manufacturer of Paper and Paper Products
Tohoku District	Miyagi Oki Electric Industry Co., Ltd	Manufacturer of Electric Machinery and Equipment
Kanto District	Ricoh Co., Ltd Gotenba Branch	Manufacturer of general Machinery and Equipment
Kanto District	Asahi Glass Co., Ltd. Sagami Branch	Manufacturer of Glass Products
Kanto District	Torii Pharmaceutical Co., Ltd. Sakura Factory	Chemical Industry
Kanto District	Topcon Corporation	Manufacturer of Precision Machinery and Equipment
Chubu District	Melco Inc. Kakegawa Factory	Manufacturer of Electric Machinery and Equipment
Chubu District	Showa Gousei Co., Ltd.	Manufacturer of Transport Machinery and Equipment
Chubu District	Denso Corporation Nishio Factory	Manufacturer of Transport Machinery and Equipment
Hokuriku District	BFU Co., Ltd.	Manufacturer of Electric Machinery and Equipment
Chugoku District	Kanebo Ltd. Boufu Factory	Chemical Industry
Chugoku District	Japan Tobacco Inc. Yonego Factory.	Tobacco Manufacturer
Shikoku District	Teijin Ltd. Matsuyama Branch	Chemical Industry
Kyushu District	Bank of Saga Ltd.	Banking and Trust

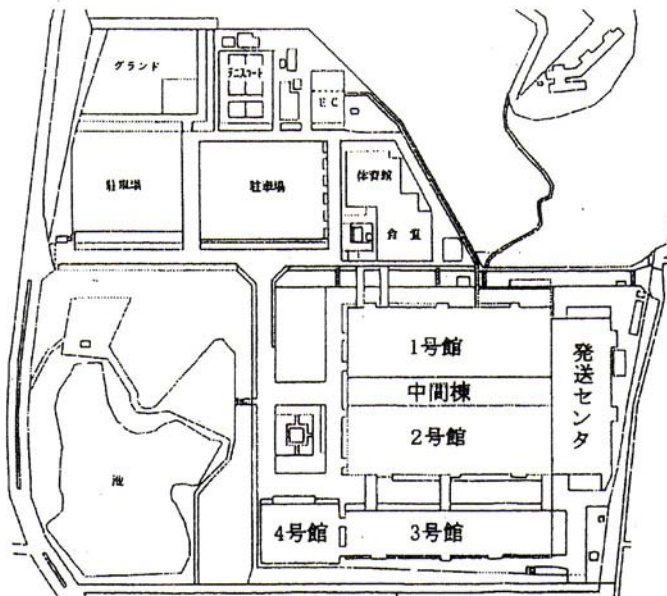
Manufacturer of Electric Machinery and Equipment

Application of Insulation Coating on Factory Roofs

○ Factory Information

Capital	¥2000Million (\$17Million)	Contract Demand	4,700kW	Voltage	33kV	Site Area	181,751 sqm	Building Area	86,000 sqm
Main Product	Video Camera	Electric Power Consumption Rate	1,320,000kwh/ ¥1million	% of Electricity Cost in Production Price	0.18%	Workers	2,500	Electricity Related Workers	7

○ Factory Site Map



Bldg. Name	Area (sqm)	Note
Bldg.1	12,600	
Bldg.2	12,600	
Bldg.3	7,100	Not Applied
Bldg.4	Not Included	
Middle Bldg.	4,400	
Shipping Center	6,900	
Dining Bldg.	2,400	
Gym	1,600	Not Applied
Energy Center	1,400	
TOTAL	49,000	

*40,300sqm is applied so far.

○ Reasons for improvement

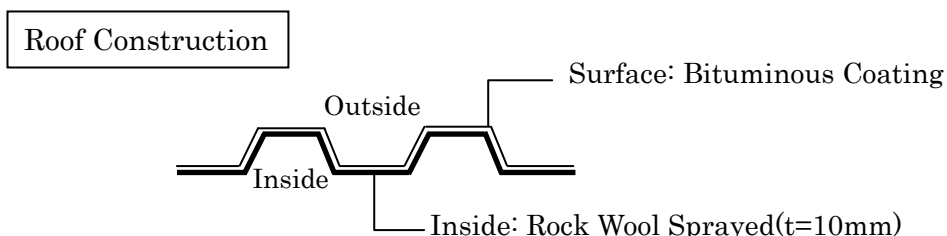
Out of all electric energy that this factory consumes, the energy used for air conditioning is high, and it takes up about 30%. The energy consumption rate for air-conditioning in summer is especially increasing due to the automation of offices and factories.

There are nine buildings in this factory and the first construction of Building 1 began in 1973, and the construction of the roofs was corrugated metal sheets + paint. Due to this roof construction, it had poor insulation performance, and it was a burden to the air conditioners in summer.

The temperature of the roof surface was very high due to the radiant heat, and the work environment was also poor. They had to lower the temperature setting of the air conditioner. Therefore, there was a need for improvement in energy saving.

o **Improvements**

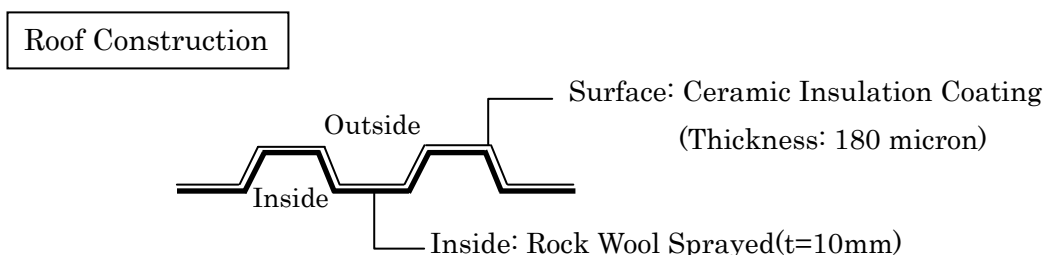
Before:



Due to the deterioration of coating, application was done as a part of the renovation project.

(Change of Coatings)

After:



Ceramic Insulation Coating was applied by spray in two layers to the surface of corrugated metal sheet roof.

Composition: **COOL THERM (SUPER THERM®)**

Water-Base Paint (Acrylic Resin + Urethane Resin + Three Kinds of Ceramics)

*Insulation Mechanism-----Two kinds of ceramics repel sun light.

The third ceramic works as a vapor barrier

o **Results**

1. Energy Saving

Condition: Fine day in summer Outside Temperature: 32C (90F)

	Outside Surface Temp	Room Surface Temp.
Before	63C (145F)	61C (141F)
After	41C (105F)	38C (100F)
Difference	▲ 22C (71F)	▲ 23C (73F)

Energy Saving Effect:

$$\begin{aligned}
 & 40,300\text{sqm} \times 23\text{C (73F)} \times 2.76\text{Kcal/h} \cdot \text{sqm} \cdot \text{C} \\
 & \text{(K Value: over-all coefficient of heat transfer for steel)} \\
 & = 2,558,244\text{kcal/h} \\
 & 2,558,244\text{kcal/h} \times 8\text{h/day} \times 20 \text{ days/month} \times 6 \text{ months/year} \times 0.75 \\
 & \qquad \qquad \qquad \qquad \qquad \qquad \qquad \uparrow \qquad \qquad \qquad \uparrow \\
 & \qquad \qquad \qquad \qquad \qquad \qquad \text{(Period of Air-conditioning Used)} \quad \text{(Fine Sky Ratio)} \\
 & = 1,841,760 \text{ Mcal/year}
 \end{aligned}$$

Calculation of Electricity:

$$\begin{aligned}
 & 1,841,760 \times 10^3\text{kcal/year} \div 3,000\text{kcal/h} \cdot \text{RT} \times 1.2\text{kW/RT} \\
 & = 736,704\text{kWh/year}
 \end{aligned}$$

Energy Saving Cost:

$$736,704\text{kWh/year} \times \text{¥}15/\text{kWh} = \text{¥}11,050,560/\text{year}$$

2. Prolongation of Life Span

The re-painting cycle has extended from seven years to nine years.

o **Improvement Evaluation**

Initial Cost for Improvement (¥10,000) (A)	Energy Saving Effect (¥10,000/year) (B)	Pay-Back Period (year) Excluding Interest (A/B)
Ceramic Insulation Coating 6,850	1,105	1.06
Bituminous Coating 5,680		
Difference 1,170		

ROI : Thirteen (13) month payback savings to investment.

Comparison of cost: Bituminous versus COOL THERM (**SUPERTHERM®**).

COOL THERM (**SUPERTHERM®**) is 20% more in cost but returns its total investment in 13 months compared to 0 return from Bituminous.