Introducing Energy Efficient Refrigeration Systems in the Indonesian Cold Chain Industry

MAYEKAWA MFG. CO., LTD.

03/03/2016

Contents

1. Company profile
2. Project profile
3. Plant profile
4. Details of Site 1
5. Details of Site 2
6. Plant Monitoring
7. Advantages of JCM
8. Future developments
1. Company Profile

MAYEKAWA MFG. CO., LTD.
Established: 1924 (Tokyo, Japan)
Corporate offices: 3-14-15 Botan, Koto-ku, Tokyo, 135-8482, Japan
Capital: 1,000,000,000 yen
Employees: 4407 (12/2015/31, including group companies)
President: Tadashi Maekawa

Domestic factories:
- Ibaraki
- Nagano
- Hiroshima

Overseas factories:
- U.S.A.
- Mexico
- Brazil
- Korea
- Belgium

60 Domestic Offices / 3 Domestic factories / 37 Countries / 94 Offices / 6 Overseas factories
1. Co. Profile (Scope of Activity)

We produce various industrial, commercial refrigeration and robotic systems that are eco-friendly and energy-saving.

Food Robotics

Logistics

Food & beverages

Breweries, Oil, Gas & Chemical

Environment

2. Project Profile (Aim & Duration)

Aim

Demand for frozen food in Indonesia is expected to increase as the economy grows

Need to establish a cold chain network

A highly efficient cooling system (NewTon) using natural refrigerants is introduced in cold warehouses and food freezing freezers

Energy Conservation and Reduction in Greenhouse gas emissions realized

Duration

Sept./2013 Selected by Min. Environment, JCM Assistance (2nd Application)
Apr./2014 Agreement Concluded, Dec./2014 Hand over
Feb./2015 Plant monitoring starts
Credit up to JLY./2015 processed
2. Project profile (Plant & Effect)

Plant location
PT. Adib Global Food Supplies (Jakarta suburbs: Non Japanese maker)

Introduced Equipment
- Cooling system for frozen food warehouse (Site 1)
- Freezer for freezing fish fillets (Site 2)

Effect
- Over 20% Energy conservation realized (Electric energy consumption reduced by 165MWh annually)
- CO₂ Emissions reduced by 122t annually

2. Project profile (Consortium)

(Organization Diagram & Roles of International Consortium)

International Consortium

Main contact
Handles applications

MAYEKAWA MFG.
CO., LTD
(Lead operator)
Engineering Management

Manufactures
Cooling Devises

MRV Verification
Purchase Equipment

PT. ADIB GLOBAL
FOOD SUPPLIES
(introduce Cooling devises)

Plant construction
Technical support

PT. MAYEKAWA
INDONESIA

Maintenance, MRV support
2. Project profile (Plant location)

PT. ADIB GLOBAL FOOD SUPPLIES

“subproject 1: Cold storage in Bekasi”
Jl. Pangkalan 2, RT/RW 03/05 Kelurahan Bantargebang, Kecamatan Bantargebang Bekasi Jawa Barat

“subproject 2: Quick freezer in Karawang”
Balai Layanan Usaha Produksi Perikanan Budidaya (BLUPPB) Karawang Desa Pusakajaya Utara RT/RW 04/01 Kecamatan Cilebar Kabupaten Karawang Jawa Barat

2. Project profile (Schedule)

• Plant Installation

<table>
<thead>
<tr>
<th></th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Delivery/Installation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Test run</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Delivery/installation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Test run</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand over</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

• Establish CO₂ emissions reduction from Feb./2015
PT. ADIB GLOBAL FOOD SUPPLIES: daily report & compile Electric power bought (used)
MAYEKAWA MFG. CO., LTD: Compile Integral power data
MAYEKAWA MFG. CO., LTD: Check & analyze data

• Present: Process credit up to JLY./2015
3. Plant profile (Features of NewTon)

Structure
- Semi hermetic two stage compressor with highly efficient new type of rotor
- IPM Inverter-motor : efficient operation adjusting to load
- Shel & plate heat exchanger: Refrigerant charge and leakage minimization, compactness

Features
- Primary refrigerant is ammonia
- Secondary refrigerant is CO₂
- No ammonia leakage on the load side
- Electric consumption reduced by more than 20%
- Remote monitoring for trouble shooting

System

4. Site 1 (Warehouse)

Plant outline
### 4. Site 1 (Plant specifications)

<table>
<thead>
<tr>
<th>Equipment name</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Refrigeration system (NewTon)</strong></td>
<td><strong>Type</strong>: NewTon R-6000</td>
</tr>
<tr>
<td></td>
<td><strong>Refrigerant</strong>: NH$_3$/CO$_2$</td>
</tr>
<tr>
<td></td>
<td><strong>Refrigeration capacity</strong>: 187 kW</td>
</tr>
<tr>
<td></td>
<td><strong>Dimensions</strong>: 4,800W $\times$ 2,400L $\times$ 2,650H</td>
</tr>
<tr>
<td></td>
<td><strong>Operating weight</strong>: 8,200 kg</td>
</tr>
<tr>
<td><strong>Cold storage</strong></td>
<td><strong>Dimensions</strong>: 14,000W $\times$ 23,000L $\times$ 11,000H $\times$ 3</td>
</tr>
<tr>
<td></td>
<td><strong>Cooler capacity</strong>: 26 kW</td>
</tr>
<tr>
<td></td>
<td><strong>Number of coolers</strong>: 6 sets</td>
</tr>
<tr>
<td></td>
<td><strong>Expected CO$_2$ reduction</strong>: 96 t CO$_2$/year</td>
</tr>
</tbody>
</table>

---

### 4. Site 2 (Freezer)

**Plant Outline**

![Diagram of Plant Outline](Diagram.png)
4. Site 2 (Plant specifications)

<table>
<thead>
<tr>
<th>Equipment name</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigeration system (NewTon)</td>
<td>Type : NewTon F-300</td>
</tr>
<tr>
<td></td>
<td>Refrigerant : NH₃/CO₂</td>
</tr>
<tr>
<td></td>
<td>Refrigeration capacity : 66 kW</td>
</tr>
<tr>
<td></td>
<td>Dimensions : 2780L×1,950W×2,400H</td>
</tr>
<tr>
<td></td>
<td>Operating weight : 4,700 kg</td>
</tr>
<tr>
<td>Freezer</td>
<td>Type : MSF-1509-TJAX</td>
</tr>
<tr>
<td></td>
<td>Frozen product : Fish fillets : 200 g/piece</td>
</tr>
<tr>
<td></td>
<td>Product temperature : 10°C (in) → −18°C (out)</td>
</tr>
<tr>
<td></td>
<td>Capacity : 250 kg/h</td>
</tr>
<tr>
<td></td>
<td>Dimensions : 3,000W×12,350L×3,050H</td>
</tr>
<tr>
<td></td>
<td>Expected CO₂ reduction : 26 t CO₂/year</td>
</tr>
</tbody>
</table>

6. Plant monitoring

Role of Items 1, 2 & 3

<table>
<thead>
<tr>
<th>Item</th>
<th>Purpose</th>
<th>Record keeping</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Measure electricity consumption of refrigerator (NewTon)</td>
<td>record daily in log book</td>
</tr>
<tr>
<td>2</td>
<td>Measure monthly national electricity grid consumption</td>
<td>Send the monthly invoice from PLN to Mayekawa Japan via email</td>
</tr>
<tr>
<td>3</td>
<td>Measure elapsed time of on-site power generator (internal power generation)</td>
<td>record daily in log book</td>
</tr>
</tbody>
</table>

Refrigerator automatic data recording and analysis

- Monitoring point
- Secondary refrigerant (CO₂)
- Cooling water
- Defrosting water
6. Plant monitoring (2015 results)

7. Advantages and problems of JCM

Advantages

- High quality and highly efficient but expensive plants, can be introduced through the JCM system
- We expect increase in number of JCM applications as the energy conservation effect and advantages are understood
  (We have had repeat orders from customers after JCM applications)
- Develop good working relationship with customer through JCM
- The publicity effect is big, many inquiries thereafter
- A consultant prepares methodology, MRV instead of inexperienced people
- Credit is allotted according (CO\textsubscript{2} emission) reduction effect

Problems

- Cost price is presented to the customer (In case of a consortium)
- Methodology, MRV handling/preparation is free of charge
- Plant maintenance is free of charge
- Calibration and verification of measuring instruments handled free of charge
- Duration of verification time and costs involved during this period
7. Advantages and problems of JCM

Advantages

- High quality and highly efficient but expensive plants, can be introduced through the JCM system
- We expect increase in number of JCM applications as the energy conservation effect and advantages are understood
  (We have had repeat orders from customers after JCM applications)
- Develop good working relationship with customer through JCM
- The publicity effect is big, many inquiries thereafter
- A consultant prepares methodology, MRV instead of inexperienced people
- Credit is allotted according (CO₂ emission) reduction effect

Problems

- Cost price is presented to the customer (In case of a consortium)
- Methodology, MRV handling/preparation is free of charge
- Plant maintenance is free of charge
- Calibration and verification of measuring instruments handled free of charge
- Duration of verification time and costs involved during this period

8. Future developments

JCM assistance system was used to introduce refrigeration systems for a warehouse and freezers for frozen food in Indonesia.
MYCOM has a lot of branches in Asia, south and central America and is active in JCM signatory and neighboring countries.
In addition to refrigeration units, MYCOM also offers heat pumps, adsorption chillers as well as many other energy conserving machines using natural refrigerants and energy conservation technology.
We hope that you will utilize this opportunity and use the JCM assistance scheme to introduce high quality, highly efficient and safe refrigeration systems in warehouses, food and beverages industry and construct a robust cold chain network.
Thank you for your attention