

Thermal storage

Nakashibetsu Plant of MEGMILK SNOW BLAND Co., Ltd.

Nakashibetsu-cho is a town located in the east of Hokkaido. Its climate is suitable for production of good-quality milk and cheese, and the region surrounding the town is one of major dairy regions. About 700 to 800 tons of milk is carried everyday from surrounding dairy farmers into "Nakashibetsu Plant" of the company, which was completed in 2007, to produce cheese and other products and also delivered to other factories as raw milk. This plant also serves as a regional distribution facility for raw milk.



Location: 2-9 Maruyama, Nakashibetsu-cho, Shibetsu-gun, Hokkaido
Site area: 64,000 m²
Total floor area: 17,500 m²
<http://www.meg-snow.com/>

Strict temperature control in cheese production

Leveling of electricity loads and improvement of business efficiency achieved by the introduction of a thermal storage system

Challenges before introduction

Challenges of disparity in electricity demand between daytime and nighttime, and difficult temperature control of air conditioning

Cheese is a fermented food product and requires strict temperature control of each process of production and air conditioning. Slight difference in temperatures affects the quality of cheese. As conventional refrigerators used in our former plant worked slowly, temperature control of air conditioning was difficult. Moreover, the disparity in electricity demand between daytime and nighttime was large, and it was also a challenge that such disparity in our new large plant increased by about three times.

Positive effects after introduction

Leveling of electricity loads is achieved by shifting about 3,700 kWh of our electricity demand per day to nighttime.

The new plant introduced a thermal storage system that consists of large and highly efficient turbo refrigerators, water-cooled chillers and thermal storage tanks. On peak power demand days in 2008, about 3,700 kWh of our electricity demand per day could be shifted to nighttime thanks to thermal storage which utilizes nighttime power, and it is estimated that contract demand could also be reduced by about 600 kW. As a result, drastic leveling of electric power loads was achieved. Furthermore, the labor of temperature control in the production processes was also reduced.

Customer's voice



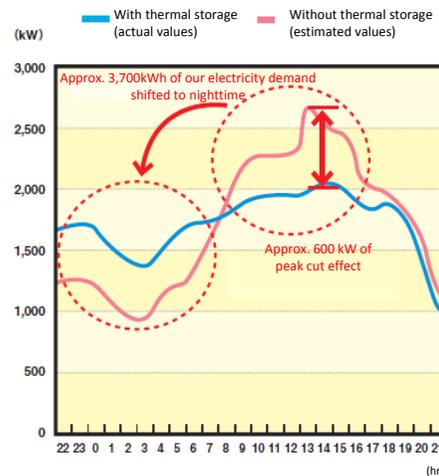
Mr. Tomoyoshi Moriyama
Manager
Equipment Technology Group
Production Control Department
MEGMILK SNOW BLAND Co., Ltd.

Since there is no holiday to stop milking, raw milk is carried everyday throughout the year from dairy farmers into our plant. As the plant also serves as a distribution facility for raw milk, it is a matter of course that a large amount of cold water is required when such raw milk is cold-stored in milk storage tanks. In addition, as cheese production requires a heating process and the temperature in the production room increases, space cooling is also needed.

Therefore, cooling loads are really large. At the time of construction of the new plant, how to efficiently secure and control the cold water posed a big challenge.

Though we had no experience in using turbo refrigerators until then, we highly evaluate the combination of turbo refrigerators and thermal storage system because of little labor required for control, maintenance and management.

Load leveling effect by introduction of thermal storage system



Points of new system

Thermal storage system making use of nighttime power to support cooling loads of large plant

Raw milk is carried into Nakashibetsu Plant every morning and cheese production starts. Since the work is conducted mainly during daytime, the peak of cooling loads also takes place during daytime. Moreover, as the scale of the new plant is larger and its cooling loads are significantly larger than that of the former plant because positive-pressure air conditioning equipment is introduced in important sanitary areas, the disparity in electricity demand between daytime and nighttime was expected to increase by three times.

Additionally, raw milk that is carried into the plant is heated to 75°C for sterilization and then quickly cooled down to 30°C. And, lactic acid bacteria and enzyme are added to milk and the milk is heated and stirred at the same time. Then, liquid is removed and curd as raw material of cheese is produced. The curd is cooled down to 10°C and stored. As described above, since heating and cooling is repeated in cheese production process, strict temperature control is required to stabilize the quality. As conventional refrigerators worked slowly, operation control was difficult.

To solve such problems, the new plant introduced a thermal storage system that consists of large and highly efficient turbo refrigerators, water-cooled chillers and thermal storage tanks. As heat is stored during nighttime, it has become possible to supply a large amount of cold heat instantaneously to air conditioners and production processes when cheese is produced during daytime, and the quality of cheese is stabilized and leveling of electricity loads is achieved. Also, as the labor of operation control and maintenance is reduced, the business management efficiency has been improved.

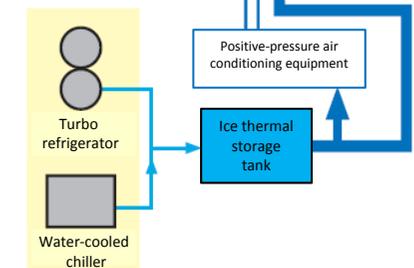
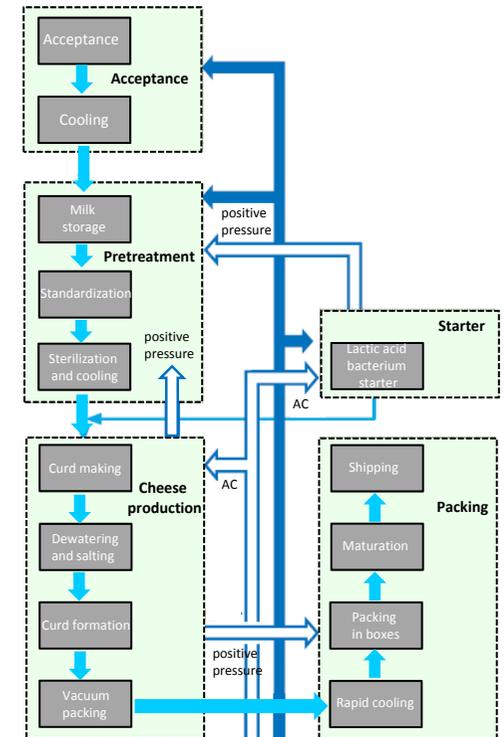
In Nakashibetsu Plant, a large amount of cooling loads generally required by large factories is covered by cold heat stored by making use of nighttime power, except for daytime follow-up operation that is conducted during a certain period in summer.



↑ Cheese production room air conditioned by positive pressure equipment

Outline of system introduced

Natural cheese production process



Outline of equipment

- Time of introduction: 2007
- Pieces of equipment introduced:
 - Turbo refrigerator 1,395 kW (ice making period) x 2 units
 - Water-cooled chiller 240 kW x 2 units
 - Ice thermal storage tank 84 m³ x 3 units



↑ Ice thermal storage tank



↑ Turbo refrigerator