

Nippon Yakin Kogyo

Award: Sustainability
Category: Energy Intensity

Implementation of energy-saving by IGBT element

Challenge

A Gate Turn-Off thyristor (GTO) element was used to drive a motor. However, there was a serious problem due to the loss of power.

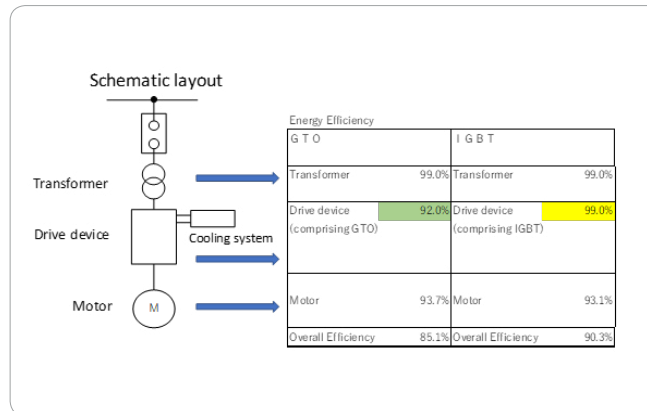
Motors (2 sets) Power Loss; 674kW
Converter (2 sets) Power Loss; 928kW
Transformer (2 sets) Power Loss; 144kW
Overall Loss; 1,746kW (Efficiency 85.1%)

Action

When considering the replacement of the device, we decided to replace it with one device using an Insulated Gate Bipolar Transistor (IGBT) element instead of a GTO element. After the replacement, the figures for the power loss are as follows.

Motors (2 sets) Power Loss; 742kW
Converter (2 sets) Power Loss; 220kW
Transformer (2 sets) Power Loss; 112kW
Overall Loss; 1,074kW (Efficiency 90.3%)

The energy efficiency was improved by 672kW.



GTO: (Gate Turn-Off thyristor)

A gate turn-off thyristor (GTO) is one of the special type of thyristor.

The GTO has a function that can turn off itself by passing a current in the reverse direction to the gate.

IGBT: (Insulated Gate Bipolar Transistor)

An insulated gate bipolar transistor (IGBT) comprises a field effect transistor.

The IGBT is applied for power control.

Outcome

By installing the new device comprising the IGBT

element, we achieved a reduction in the annual power consumption as follows.
Annual power Consumption
Previous device (GTO element); 5,478MWh
New device (IGBT element); 2,451MWh
Therefore, we can now save 3,027MWh of energy.



New device (IGTB element)