Mi-ACE

MIMOS Autonomous Chiller Control & Energy Efficiency

Mi-ACE is an intelligent system for chiller optimisation, and energy audits and supports overall engineering services. The engineering solution utilises IoT, AI and cloud computing technology.

Overview

MIMOS Autonomous Chiller Control & Energy Efficiency (Mi-ACE) is an intelligent system that enables chillers to maximise efficiency, saving 12 to 20% of a chiller plant's total energy consumption. Mi-ACE's algorithm analyses data from all sensors and devices installed at strategic locations in a building to determine the optimum performance needed for chiller efficiency while ensuring occupants stay comfortable. Mi-ACE is hardware-light and non-intrusive to existing systems.

Features

Mi-ACE provides the following features:

- **Genetic Algorithm (GA)**
  The Mi-ACE system is designed to acquire real-time psychrometric data. It uses a Genetic Algorithm (GA) to derive its own unique dynamic thermal control algorithm.
- **Fuzzy Logic Control Algorithm**
  Mi-ACE with a Fuzzy Logic Control algorithm, can optimise and manage the building/facility's chiller load matching the dynamic changes in heat gains throughout operation.
- **Real-time Heat Transfer Monitoring**
  Mi-ACE monitors heat transfer, and chiller heat gain and heat rejection. This enables a desired indoor temperature with +/-2% accuracy of set point temperature.
- **State-of-the-art IoT, Cloud and Big Data Analytics**
  Mi-ACE deploys state-of-the-art IoT for data gathering, an on-cloud energy dashboard, and multidimensional data readings.

Technology Benefits

The main impacts of Mi-ACE are:

- **Increase Electricity Bill Savings**
  Mi-ACE enables an estimated reduction in electricity bill charges between 12 to 20% from the current chiller system.
- **Enhance Asset Life Expectancy**
  The system prolongs chiller life expectancy by enabling soft start and stop.
- **Digital Maintenance System**
  Computerised Maintenance Management System (CMMS) provides real-time data on the current condition of chillers and pumps, cooling tower, air handling unit (AHU) and valves.
- **Optimum Building Climate Control**
  An optimum temperature is maintained in a building at all times. This ensures that occupants do not feel too cold or warm throughout the day.
- **Minimise Carbon Footprint**
  Mi-ACE enables chillers to run at optimal efficiency at all times minimising the greenhouse effect and leading to a reduction in noise and emission.

Applications

Mi-ACE is:

- **Suitable: Centralised Air Conditioning Facilities**
  Malls, office buildings, hospitals, airports, industrial facilities and many others.
- **Compatible: Air-cooled and Water-cooled Chillers**
  Reciprocating, centrifugal, screw and scroll compressors.

Case Study: MIMOS Wafer Fab

Mi-ACE autonomous chiller operations incorporated Mi-SPARK gateway with wireless IoT sensors integration for accurate data reading. Installation was quick with reduced interruptions. It achieved a reduction in energy consumption thus impacting CO2 savings and sustainability. This enabled precise chiller operations monitoring and diagnostics and improved capabilities.

Segment type	Industrial
Building type	Industrial
Application type	Process Cooling
Chiller manufacturer	York/Carrier
Installed capacity	1550RT
Date system installed	Dec 2020
YTD saving average	22.3%
Manpower savings	48 hrs/month
	576 hrs/year

Total CO_2e Emission Saved
836.3 Tonnes CO_2e
RM118,383 @ $30/tonne

Total MWh Saved Annually
1205MWh
RM494,050

Total Number of Trees Saved
14,100 Trees

Average Savings (%)
22%

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