

How can you maintain your Chiller plant at peak performance with the least operating cost, day after day and year after year?

HVAC equipment design had been steadily improving over several decades. Performance optimization remains as a major opportunity to be tackled. The critical barrier is the knowledge on dynamic performance of the plant and machinery.

Datamatrix offers a suite of innovative technologies for fluid systems using a new paradigm of virtual metering (Patent 236496). It derives the hydraulic parameters from the energy signature of the prime mover. It transforms each energy meter into an integrated suite of virtual meters sensing process parameters such as flow rate and pressure. These networked systems running independently monitor the performance of machines, systems and process, creating a Virtual Plant.

Even new “state of the art” commercial HVAC systems lose operational efficiency after installation. How is it done differently?

All machines start deteriorating in performance, soon after commissioning. The operating conditions vary due to the change in demand, ambient temperature and humidity etc. Several maintenance issues also start progressively, altering the performance matrix of machines. Even the best designed and maintained plant performance drifts over a period and remains undetected for long. These small changes can have a cascading effect on plant performance.

The most widely accepted approach to get back to the best efficiency is the process of commissioning. Datamatrix establishes a process of continuous commissioning by monitoring performance of each machine, system and process on an ongoing basis.

Establishing an Integrated Performance Monitoring System

A base line energy audit is conducted with detailed tests on each machine to capture the characteristic behaviour of the machines and systems.

The above data entered into the Datamatrix System forming a 'Virtual Plant in the cloud, configures a mathematical model of the plant and machinery.

A dedicated energy meter attached to each machine transmits data to the Datamatrix Cloud, computes the hydraulic parameters such as flow and pressure and identifies the dynamic performance of the machines.

The temperature sensors attached to the main header lines communicate with the Datamatrix Cloud. It computes the heating and cooling loads using the virtual flow as computed above.

The system continuously validates the simulated values. For example, the simulated pressure for each pump shall be same on a common header. These deviations provide valuable insights into the development of faults. The following figure depicts the data flow diagram and control strategy of a smart building

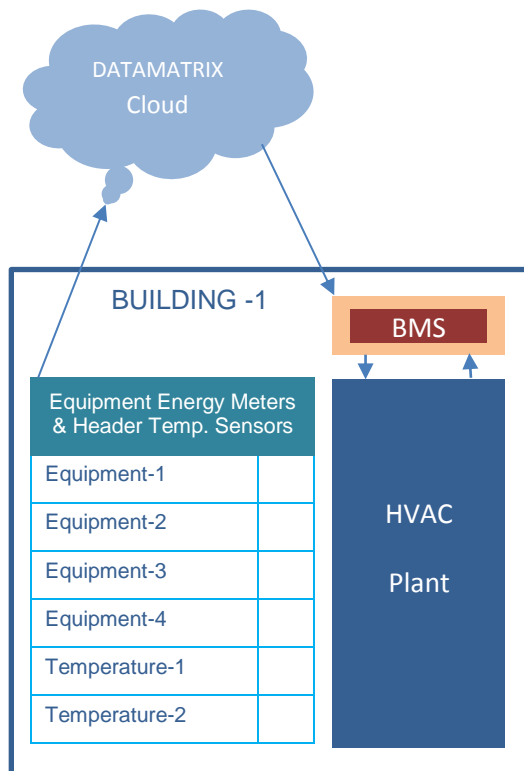


Fig-1: Data flow Diagram of a Smart Building

The system architecture is analogous to the human brain structure, where Datamatrix cloud resembles the cerebrum and the BMS, the nervous system, handling all subconscious functions (pre-set plant functions). Datamatrix provides the inputs for optimized controls to the BMS. Datamatrix can also directly control the plant.

Managing Performance

Buildings consume 40% of the energy in the world today. The HVAC systems in a modern building consumes up to 60% of its energy. Most of this energy is consumed by the Chiller plant. The Chiller plant also demands the lion's share of O&M budgets. Hence close monitoring of the Chiller plant is the imperative. Managing the peak load of these critical utilities can also provide several opportunities for lowering cost by demand response.

The Chiller Plant comprise of a set of discrete pieces of mechanical equipment. Each pump, chiller, tower and air handling unit is designed to be turned on and run at pre-determined speeds. The building automation systems control the equipment by turning it on and off. In this scenario, the equipment is designed to operate efficiently in isolation.

The optimum plant performance can be achieved only by maintaining a fine balance of machine, system and process performance throughout the operations. The following figure depicts the integrated performance management process adopted by Datamatrix.

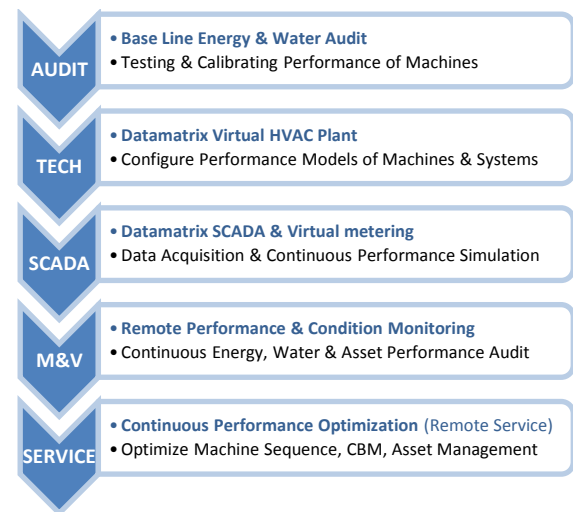


Fig-2: Integrated performance management process

Performance optimization is often a trade off against saving opportunities and the available resources. Yet there is major opportunity to optimize the HVAC system through optimum settings, sequencing and condition based maintenance, leveraging knowledge on dynamic performance of machines and systems. The solution will help to manage each machine as a profit center, significantly reducing the asset carrying cost.

Datamatrix solution conforms to the latest International Standards and best practices - IPMVP, ISO 50001 and ISO 14044 for Performance Measurement, Energy Management and Environment Management (Life Cycle Assessment). Datamatrix integrates multiple platforms such as Virtual HVAC & Chiller Plant and Virtual Pump Stations to provide an unparalleled building performance monitoring and continuous optimization.