

✚ Pump Efficiency Monitoring System (PEMS)

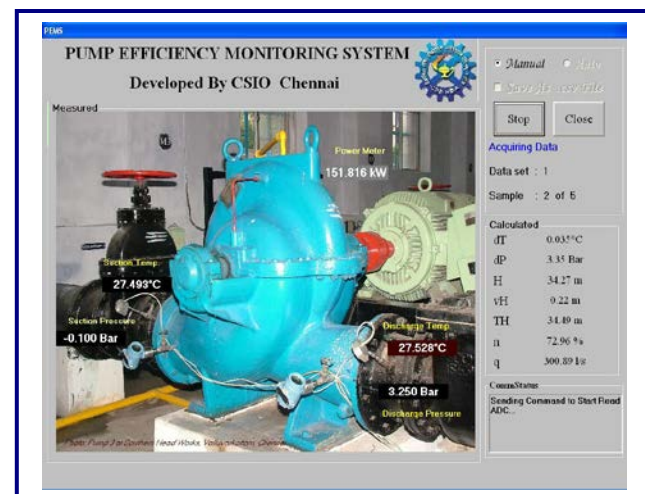
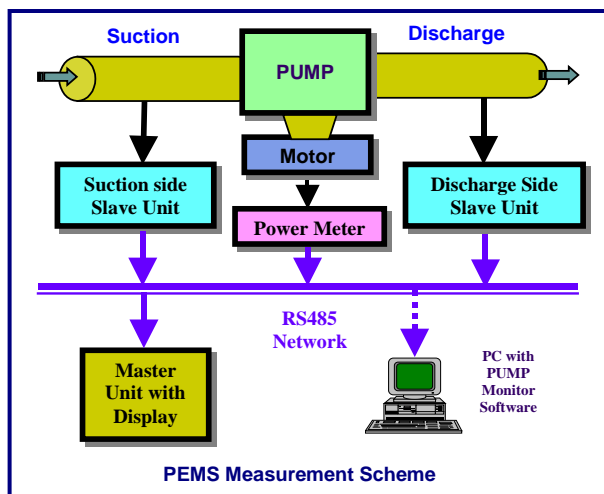
Pumping systems account for nearly 20% of the world's electrical energy demand. Energy and maintenance costs are typically about 90% of a pump's Life Cycle Cost. Studies have shown that 30% to 50% of the energy consumed by pumping systems could be saved through monitoring the efficiency. As the energy costs are soaring high, any effort in energy conservation during pump operations, can reduce the overall demand for electrical supply as well as reduce the burden on the consumer.

The conventional method of calculating pump efficiency off-line is by taking measurements of flow, electrical power consumption, head and the pipe dimensions with different instruments. The accuracy of the pump efficiency measurement is determined by the errors in the measurement of these parameters.

In practice, the flow rate, q , is the most difficult to determine accurately. Many pumps do not have flow meters, which is high cost item, especially for larger diameter pipes. Flow meter accuracy can be dependent on its installation conditions such as straight, clear pipe lengths prior to and after the measuring device, the pump's operating point.

The thermodynamics method can calculate pump efficiency by measuring the thermodynamic parameter (temperature, the pressure of the inlet and outlet, etc.) and the physical properties (density, specific heat, etc.) of fluid according to thermodynamic law. This method does not use flow as a parameter, thus reducing the cost of the system.

CSIO Chennai Centre has developed a low cost Pump Efficiency Monitoring System (PEMS) based on the thermodynamic principle using the latest state-of-art instrumentation. PEMS is an on-line pump efficiency-monitoring tool. The pump losses are calculated from *measurement of inlet and outlet fluid temperature and the dynamic head* developed by the pump. Pump Efficiency is then calculated. By monitoring electrical power input to the motor, the pump flow rate is calculated.



Features:

- ❖ Single unit capable of on-line monitoring
 - suction temperature & pressure,
 - discharge temperature & pressure,
 - electrical power,
- ❖ Temperature measurement with an accuracy of 0.001°C.
- ❖ Power measurement with an accuracy of 1%
- ❖ Capable of configuring the pump parameters
- ❖ Capable of displaying & logging data in *.CSV format for analysis
- ❖ Calculates head, efficiency & flow rate of the pump
- ❖ On-line Flow & Efficiency measurement with an accuracy of 1%
- ❖ Operation of pump with optimum energy consumption leading to energy savings

Utility:

- ❖ Can be used in Water supply schemes for
 - Proper Planning & Maintenance of the pump
 - Refurbishment of the pump at the appropriate time periodically to increase the life of the pump
 - Operation of pump at Best Operating Point (BOP)
- ❖ Organizations utilizing or maintaining large pumps and turbines
- ❖ Industrial sectors like Petrochemical, Mining, Pulp and Paper, Irrigation, Hydroelectric, Power Generation