

SUMMARY – Facility C

In late November through early December of 1999, Supersymmetry conducted an energy efficiency survey of Facility C located in Northwestern US. The survey focused on mechanical systems in the building including pumps, fans, chillers and air compressors. Facility C is a manufacturing facility which falls into the semiconductor industry. Facility C is a 80,000 sf facility which houses approximately 12,000 sf of class 100 and 5,500 sf of class 1,000 cleanroom spaces as well as office space.

The central plant consists of three evaporative cooled glycol chillers with one serving as backup. The chillers are rated at 450 tons apiece. The average load of the chillers during the monitoring period was 530 tons. There are also three cooling towers, two hot water boilers, three general exhaust fans and three scrubbed exhaust fans. Three compressors and de-ionized (DI) water are serving the cleanroom.

The central plant and a class 100 cleanroom (11,300 primary sf) were monitored for three days each. Trended measurements were taken at one minute intervals for the chilled water and compressed air systems. Spot measurements were taken to characterize the make up and recirculation air handlers. Some of the most important metrics are summarized below in Tables 1 and 2. Note that these metrics were calculated based on the data collected during the monitoring period and may not reflect the current operating conditions.

Table 1. Metric Results for Facility C

Metric Name	Metric Value
Central Plant Chiller Efficiency	0.63 KW/ton
Central Plant Chilled Water System Efficiency	1.15 KW/ton
Class 100 Make Up Fan Efficiency	540 cfm/kW
Class 100 Recirculation Fan Efficiency	10,100 cfm/kW

The metrics indicate that the chillers are operating at a moderate efficiency level. However, the overall chilled water system efficiency is poor due to problems in the primary-secondary pump system. The pressurized plenum, recirculation system for the class 100 cleanroom is the most efficient when compared to the other monitored class 100 cleanrooms. The design cfm/kW of this system was 5,000. The system was operating at an impressive 10,100 cfm/kW. The recirculation system was designed with large axial fans discharging air into an 8 foot plenum. The air is returned in a raised floor plenum of 4 feet high. The large airflow paths mean almost negligible pressure drops as compared to a ducted supply system. The make up air handler efficiency is in the lower percentage of the measured range of 540 – 1800 cfm/kW between the monitored sites.

Overall, Supersymmetry developed 24 different energy efficient recommendations for Facility C. The high priority, energy efficiency measures (12 measures) proposed by Supersymmetry estimated annual energy savings of 6,500 MWh and 146,000 Therms.