



Recommissioning of an Office Building

A recommissioning effort was undertaken at an office building that was part of the State Capitol Complex for the State of Minnesota. The office building has 59,000 sq. ft. of conditioned area with a constant volume air handling system. The building has a 225 ton centrifugal chiller that supplies chilled water for summer cooling, and receives hot water from a district heat supplier. The hot water is used in perimeter radiation and approximately 150 terminal boxes with reheat. The reheat system is used in the winter to accommodate the varying heating loads throughout the building and the summer to prevent over-cooling. The office building was selected for recommissioning because the building had easily obtainable energy use records and was experiencing mild comfort and building control problems. Figure 1 displays a front view of the office building



Figure 1. Front view of office building

Analysis of the systems within the building resulted in the identification of several recommissioning measures that would result in the reduction in both electrical and hot water consumption and improvement in occupant comfort. The recommissioning measures are listed in Table 1.

Table 1. Recommissioning Measures

Measure	Modification made
Total Supply air	Reduction from 1.0 cfm/sq.ft. to 0.8 cfm/sq.ft. Installation of VFD for adjustability.
Return air and building pressurization	Downsize from existing return fan motor and installation of VFD for building static pressure control
Chilled water pump	Match pump with the design flow of chiller evaporator.
Reheat pump	Installation of VFD for differential pressure reset control.

Summary

A summary of the savings generated by the recommissioning measures is displayed in Table 2. The annual savings from the measures totals \$11,227. The savings numbers are based on bin analysis using outside temperature data for the city of Minneapolis/ St Paul.

Table 2: Summary of Recommissioning Measures

	Savings	Electric demand reduction	Electric demand savings	Electric energy reduction	Electric energy savings	District heat demand reduction	District heat demand savings	District heat energy reduction	District heat energy savings
Supply air flow reduction Normal Hours	\$ 7,147	24.8 Kw	\$ 1,947	75,365 Kwh	\$ 2,299	31.8 Kw	\$ 1,658	108.0 Mwh	\$ 1,242
Supply air flow reduction extended hours	\$ 1,435			47,056 Kwh	\$ 1,435				
Return air flow reduction	\$ 1,489	6.9 Kw	\$ 542	31,050 Kwh	\$ 947	0 Kw	\$ -	0 Mwh	\$ -
New chilled water pump	\$ 544	5.8 Kw	\$ 191	11,566 Kwh	\$ 353	0 Kw	\$ -	0 Mwh	\$ -
Reheat HW Pump VFD	\$ 612	0 Kw	\$ -	20,072 Kwh	\$ 612	0 Kw	\$ -	0 Mwh	\$ -
Total	\$ 11,227	37.5 Kw	\$ 2,680	185,110 Kwh	\$ 5,646	31.8 Kw	\$ 1,658	108.0 Mwh	\$ 1,242

Total (electric only)	\$ 8,326
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Annual electric energy reduction was 185,110 Kwh or \$5,646. The peak demand reduction for this project was 37.5 KW or, based on the utility rates for the office building, \$2,680. A conservative estimate was made on the effect of the recommissioning work on the demand and energy reduction for the energy purchased from a district heat supplier. The computed reduction in hot water was 31.8 KW or \$1,658 in demand savings and 108 Mwh or \$1,242 in energy savings.

The recommissioning work performed on the office building resulted in \$47,222 of equipment, labor, and engineering fees. When Xcel rebates are applied, the net cost of the recommissioning work is reduced to \$37,168. The energy reduction as a result of the recommendations yielded an electrical demand reduction of 37.5 KW and an energy reduction of 185,110 Kwh per year. The electric cost savings were computed to be \$8,326 per year. Reduction in hot water consumption from district heat supplier was conservatively estimated at \$2,901 per year. The total energy reduction for both hot water and electric is \$11,227 per year which results in a simple payback of 3.3 years.

For more information about this project or other recommissioning projects, contact Martha Hewett (612) 335-5865 or Mark Hancock (612) 335-5861.