

Northern Michigan University Commissioning Reduces Energy Use

State of Michigan
Department of Energy,
Labor & Economic Growth

Bureau of Energy Systems

Rebuild Michigan CASE STUDY

Commissioning is an extensive quality assurance program that begins with the project design and continues through occupancy and operation. Commissioning ensures the building initially operates as intended and that the owner's staff is prepared to operate and maintain systems and equipment.



Residents are educated in the proper use of apartment heating controls.

Case Study prepared by
Kingscott Associates, Inc.
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Background

Northern Michigan University (NMU) has commissioned all large building projects since 1998. Ten years ago, commissioning was a relatively new concept for higher education institutions and was creating quite a buzz in the industry. There were,



however, many early dissenters of the service. Owners looked at commissioning as an unnecessary cost; they expected the design engineer or the contractor to ensure the mechanical, electrical, and controls systems were installed correctly and functioning properly. In reality, there will be system faults that become issues and result in unhappy occupants and higher energy use and costs.

NMU's commissioning of Woodland Park Apartments demonstrates how and why the University prefers to use this service.

Commissioning Woodland Park Apartments

Woodland Park Apartments was constructed in 2006. It is a 105,000 sq. ft., three-story student apartment building on campus, and it has eighty-nine apartments configured into efficiency, 1-, 2-, and 4-bedroom units. The construction budget was \$13.5 million and included approximately \$2.065 million in mechanical systems. System commissioning was not originally planned, but Bob Ryan, NMU's Director of Heating Plant, discovered that grant money was available for commissioning demonstrations from the State

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The commissioning agent provided an independent third-party design and construction review.

NMU issued a Request for Proposal for the commissioning services. The low bidder was an agent that had previously commissioned projects for the University. The commissioning agent worked directly with Bob Ryan, NMU's Project Director, throughout the project.

of Michigan's Rebuild Michigan program. He applied for and received \$21,000 to commission the mechanical systems in this new facility.

The commissioning agent provided an independent third-party design and construction review that included checking the construction documents for potential improvements and/or deficiencies; implementing detailed checklists to ensure proper equipment installation and functionality; and observing construction, equipment start up, and owner training. Through this process, 170 items were identified as areas for potential improvements and/or deficiencies. Twelve of these items resulted in electric, gas, and water use reduction with an estimated total annual savings of \$15,700 and a 1.4-year payback on the commissioning costs. The following table summarizes some of the recommendations and associated annual savings.

Recommendation	Estimated Annual Savings
Change the operating schedule for the exercise and commons rooms' air handling units, resetting the thermostat during unoccupied hours to reduce heating and cooling energy usage ¹	\$1,775
Educate building occupants on the proper use of temperature controls for heating elements in each apartment to reduce boiler and pump use.	\$6,309
Lower the thermostat on cabinet heaters in building entryways from 80° F to 65° F to reduce boiler, pump, and fan usage.	\$852
Modify the ductwork installation to provide smoother transitions, reducing the fan energy use required. ²	\$1,149
Repair or replace heating control valves, providing complete shut off to reduce boiler and pump operation.	\$952
Optimize heating pump operation to reduce energy use associated with unnecessary pressure loss at control valves.	\$2,311
Revise the air handling unit controls to reduce cooling energy by using more outdoor air when it's cool outside and using less air during periods of low occupancy.	\$1,702
Replace dirty filters in cabinet heaters to reduce fan energy use.	\$491

¹ NMU personnel are reviewing the actual building usage to determine feasibility of the recommendation.

² Portions of the ductwork have been revised as recommended. Other areas were left as installed after it was determined that system performance was not compromised.

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Recommendation	Estimated Annual Savings
Repair leaks in the heating system to reduce water use.	\$251

Other major items discovered and addressed before the building was occupied included: heating controls that would prevent heating during loss of power, uninsulated water piping in the unheated attic, and issues with code compliance.



“Commissioning has been great,” says Bob Ryan, NMU’s Director of Heating Plant, “It identifies problems early, and we have fewer complaints and happier tenants.”

Conclusions

“Commissioning has been great,” says Bob Ryan, “It identifies problems early, and we have fewer complaints and happier tenants.” He knows that it costs more initially, but saves money in the long term. He is an advocate of the process and would like to use the service even on small retrofit projects.

Mr. Ryan had some thoughts for potential commissioning users:

- It’s important to use a good, experienced commissioning agent...one who follows through and that you trust. NMU worked with an agent that had previously commissioned projects for the University. The commissioning agent worked directly with Bob Ryan throughout the project.
- Because the commissioning agent for this project was brought on board during construction, most of the recommended changes were made during construction...not after the building was complete. Contractors were still on site, and they made the repairs as part of the overall project.

Figures are based on data received from owner or owner’s performance contractor. Kingscott does not guarantee accuracy of data.