MONCRIEF-NEUHAUS ATHLETICS CENTER (MNC)

ABOUT THE PROJECT
In 2018, the Energy Management and Optimization (EMO) division of UT Utilities and Energy Management completed an existing building commissioning (EBCx) project at the Moncrief-Neuhaus Athletics Center (MNC).

WHAT WAS DONE
Several fans, dampers, and steam valves were repaired. Two unit heaters and an exhaust fan that were running unnecessarily were shut off. Programming changes were made to the Air Handler (AHU) level and Mixing Lateral (MXL) level in order to optimize the system performance and realize energy savings without sacrificing occupant comfort. In coordination with UT Athletics, schedules were adjusted for when the building was unoccupied or not in use, such as during holidays.

RESULTS
Since completion of the project, the MNC building has experienced an overall energy cost avoidance of 15%, resulting in an annual savings of $47,800 in utilities for Athletics. Accounting for all project costs, including equipment repair and staff labor, the project realized a simple payback in just over a month.

BIG THANKS TO…
This accomplishment was a group effort, and the EMO team wishes to thank the following organizations and teams:

- Jason Rodriquez, Assistant Red McCombs Red Zone Coordinator
- Athletics Maintenance Staff
- Zone Maintenance
- Building Analyst Team
- Upper management of Utilities and Energy Management

Additional information may be found on the following pages.
Final Savings Report

Existing Building Commissioning
At
Moncrief-Neuhaus Athletics Center

Written and implemented by: Energy Management and Optimization group
Prepared for: University of Texas at Austin Athletics

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Executive Summary

After completing successful existing building commissioning (EBCx) projects at the North End Zone Building (NEZ) and the Denton A. Cooley Pavilion (DCP), Energy Management & Optimization (EMO) was commissioned to do the same process for Moncrief-Neuhaus Athletics Center (MNC). EMO began the analysis in spring of 2018, and completed the project in the fall later that year.

Due to the imminent renovation of MNC, the project scope was to be limited to low to no cost repairs and energy conservation measures (ECMs).

The project scope included identifying functional issues, repairing or replacing faulty system components, shutting down unnecessary equipment, and improving the Air Handler [AHU] and Mixing Lateral [MXL] sequences of operation.

The project resulted in a **15% overall annual energy cost avoidance**. This amounts to over **$47,000 in energy savings per year** for Athletics. With a project cost of $4,700, the project realized a **simple payback of 1.2 months**.

Repairs

EMO identified the following functional issues, which were repaired by a joint effort of Facilities maintenance staff and Athletics’ maintenance staff.

- Repaired 1 Exhaust Fan.
- Recalibrated 2 Supply Fan VFDs.
- Repaired 2 Outside Air Dampers.
- Repaired 1 Outside Air Fan.
- Repaired 1 Supply Air Fan
- Replaced 2 Steam Valve E-P transducers that were causing steam leak-past.
- Shut off 1 Exhaust Fan (VAF-1) running 24/7 unnecessarily.
- Shut down 2 unit heaters unnecessarily heating mechanical rooms.

Optimization of Sequences of Operation

EMO optimized the sequence of operations for all 6 Air Handlers, and 18 Mixing Laterals that have digital control. Programming was implemented by Facilities Operations.

Air Handlers

MNC has six AHUs. Only AHU 6 has full digital control to the zone level. Most spaces in the building have a higher cooling load, and the general feedback from occupant interviews was a want for more cooling. Based on that feedback we made the following changes to the AHU sequences of operation.

**Unoccupied Scheduling and Holiday Scheduling**

When the space is unoccupied, the supply fans slow down and the space temperatures setback. The AHUs return to normal operation early enough to return to occupied conditions by the time the building opens, so that occupants will not be uncomfortable in the morning. The unoccupied time periods are mostly overnight but also include extended unoccupied periods such as holidays. All schedules are coordinated with Athletics staff.
AHUs serving the weight room, equipment room, locker room, coaches offices and doctor’s offices run 24/7 except for limited holiday exceptions.

**Hot Deck Supply Pressure Resets**
This strategy allows the AHU’s hot deck to reduce the flow of hot air to the building when the outside air is warm. This helps reduce simultaneous heating and cooling, and allows for savings from a reduced fan speed.

Normally, a similar strategy is implemented for the cold deck, but due to the occupant feedback for more cooling, we did not implement a cold deck supply pressure reset.

**Outdoor Air Reduction and Ventilation Optimization**
Outdoor air intake levels were changed to match ventilation requirements dictated by code and industry best practice. In a few instances, we actually increased the outdoor air rate, which is an energy penalty. These AHUs serve the locker room and weight room, so fresh air takes priority over energy savings.

**AHU 6: Optimum Start and Optimum Stop**
Since AHU 6 has full digital control to the zone level, it can automatically monitor space temp. This allows the AHU to use smart programming to calculate the exact amount of time it needs to recover from unoccupied mode to ensure occupied temperatures are met by the beginning of the occupied period.

**AHU 6: Cold Deck Supply Temperature Reset**
AHU 6 serves the study rooms, which have a lower cooling load than the other areas in the building. This allows us to supply a warmer cold deck temperature when the outdoor air is cooler. This reduces simultaneous heating and cooling.

**Mixing Laterals**
The following strategies were implemented across all 32 Mixing Laterals in the building.

**Average Zone Temps (where applicable)**
If multiple MXLs serve a single space, the thermostat control is averaged. This prevents MXLs from “fighting” where one MXL is cooling and another is heating at the same time.

**Expand Temperature Band (AHU 6 Only)**
By design, the system is setup to control to a tight deadband. By expanding this band, the system can run in a more efficient setting, often without the occupants noticing the difference. The setpoints were set to cooler setpoints in respect of the occupant feedback.
Results

After collecting over a year’s worth of data after project completion EMO can quantify the building’s annual energy avoidance due to the project. The results were calculated following the guidelines of the International Performance Measurement and Verification Protocol (IPMVP) Option C – Whole Facility. Using this option, savings are determined by measuring the energy use of an entire facility. The building’s energy use after the project (Post or Analysis) is compared to a model based on typical previous usage (Baseline). A copy of all data and calculations can be made available upon request.

Annual Energy Savings

To find the total avoided cost to date actual building’s use is compared (gray line) to what the building would have used if nothing had been done (orange line). The savings are represented by the orange line minus the gray line.

![Total Daily Utility Energy Cost graph]

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Appendix A: M&V Model Outputs

Pre vs. Post Usage Scatter Plots

Pre vs. Post project scatter plots are shown below. These are helpful in further showing how energy was saved in a building by comparing how a building uses energy in relation to weather. These plots show the post model usage for each utility plotted against average outdoor air temperature.

The black line represents the pre-project model average usage profile.

Each data point represents a daily usage for each utility in the post period. There are 365 points for each graph, representing a year’s usage. The gray line represents the best fit line for each post usage scatter. Obviously when the gray lines are lower than the black lines, the building is saving energy.

![Post CHW usage vs temp](image1)

![Post ELE usage vs temp](image2)

![Post STM usage vs temp](image3)