

Manager's Report

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HVAC Control System

The various components of the heating/cooling system (HVAC) such as the boiler, cooling tower, the make-up air unit, as well as the various pumps and valves that connect them are coordinated by a single panel that makes adjustments and turns things on and off. Unfortunately that panel is not functioning properly and cannot be updated or revised or modified in any way. Surprisingly, even the original facilitator, CW Industries, who installed the original panel is not willing to, or not able to provide service or make any adjustments on our system.

I have provided some details of this situation in previous [Manager Reports](#), one I have included an article from the May 27 board meeting. Generally, the most pressing issues are:

Boiler/Cooling Tower

- The boiler and cooling tower often run at the same time. This means the boiler is actively creating heat by burning large volumes of natural gas and the cooling tower is actively blowing it out into the atmosphere. Obviously that should never happen. It turns out there are numerous scenarios that prompt this behavior. Generally it is due to some rather inadequate programming along with incorrect or outdated set points that should be adjustable but aren't, and/or malfunctioning sensors and valves. In addition there are other issues that contribute to this malfunctioning behavior:
 - The outside air temperature sensor is not connected to anything.
 - Other sensors are too far away to report changes in a timely manner, or the programming is not properly taking this attribute into account.
 - The mixing valves for the heat exchanger and the MAU are not responding fast enough for the changing temperatures of the circulation medium and actually causes confusion within the system itself.
 - The mixing valve for the cooling tower is not adjusted properly or the programming is not calibrated correctly to reflect true values for the valve setting (so it is almost always is left somewhat open allowing the hot water from the boiler to run through the cooling tower).
- The relay in the panel that alternates the boiler circulation pumps is not working.
- The status relay that reports on the operation of the MAU fan motor is not connected to anything.

The MAU (Make-up Air Unit)

The Make-up Air Unit which drives outside air into the building through the common areas have a number of issues, among them:

- The dedicated control for the MAU has been bypassed probably because it stopped working, so is not providing the temperature control that was initially intended when it was first installed.
- The panel will turn on the water flow for cooling the airflow but fails to shut if off in a timely manner, allowing water to overflow the basin and run down onto the roof and down the roof drain. It will run for 20 minutes or so before the panel shuts it off. Then, after about 15 minutes media that the air flows through has dried out and the panel turns the water on again and the process repeats again (probably 30 - 40 times a day). Obviously a huge waste of water.
- Additionally, the overrun of water causes the paper filters in the MAU to get soggy and droop in their holders, sometimes falling out completely onto the floor of the MAU exposing the heat exchanger to unfiltered air (and pack up with dirt and dust).
- A solenoid drain valve has been bypassed (because the original controls have been bypassed) causing the system to be drained every time the water cooling is enabled (which may happen 30 or 40 times a day). This is another big waste of water because the system needs to be drained only when outside air temperature is near freezing which only occurs a few times during the cooling season.
- The MAU shutting down causes the 10 exhaust fans on the roof to continue to draw air up through every unit's vents in the bathrooms, but the air is not supplied by the MAU. This causes air to be drawn up through everyone's unit from the garages. Obviously the air in the garages is not suitable for continuous breathing because of carbon monoxide and other byproducts of burning gasoline. The plans did call for an interlink between these two units but was never connected by the builders. This will definitely need to be addressed.

Rob's MAU Summertime Fix During 2016

Last year I purchased and installed a small remote monitoring version of what I am proposing. It is a temperature module manufactured by ControlByWeb, the same company that provided the web-enabled sprinkler timers that we have been using for the last two seasons and I am very happy with. This temperature module has 4 inputs for digital temperature sensors and 2 remotely controllable relays. I used a public IP address and its interface is available over the internet. A screenshot of one of the interfaces is below.

VR Temperature Module		
MAU Airstream	68.5	°F
MAU Airstream Set Temp.	<input type="text" value="120.0"/>	°F <input type="button" value="Apply"/>
Outside Air	46.1	°F
Condenser Loop	76.5	°F
Boiler	182.3	°F
H2O Enable	OFF	<input type="button" value="ON"/> <input type="button" value="OFF"/> <input type="button" value="Pulse"/>
MAU Air Unit	ON	<input type="button" value="ON"/> <input type="button" value="OFF"/> <input type="button" value="Pulse"/>

You can see the various temperatures live at any time. The air coming through the make-up air unit is 68.5° and the outside air is 46, so the boiler is heating up the make-up air stream; it's at 182.3 which means it has just turned off.

The bottom two are relays that can be controlled from this screen. Over the summer I had the make-up air unit cooling controlled from this device. When the MAU Airstream temperature went above 75° the H2O Enable relay turned on the water for 90 seconds, just enough time to soak the media for cooling, thus eliminating the water wasting situation I mentioned above. While the power burner was being repaired, I turned off the MAU fan at night so cold air from the night wouldn't be drawn into the building (because there was no boiler to heat it up).

Rob's HVAC Controls Proposal

Remove existing TRC controls and install new HVAC controls manufactured by ControlByWeb to providing web-enabled Ethernet inputs and relays for controlling all aspects of the HVAC system, provide data acquisition for continuous remote monitoring, logging and scheduling. All set points will be remotely adjustable on line. The system will be complete but is also easily expandable.



Scope of Work

All parts and labor, programming and startup necessary to complete the following scope of work (This follows all points included with the Automated Buildings proposal, including all alternates):

Boiler B-1

- Hot Water Supply Temperature (New sensor and reuse wiring and thermowell)
- Boiler Enable/Disable (Reuse wiring and relay)
- Pump P3 Start/Stop (Reuse wiring and relay)
- Pump P4 Start/Stop (Reuse wiring and relay)
- Pump P3 Status (Reuse wiring and current switch)
- Pump P4 Status (Reuse wiring and current switch)
- Hot Water Valve Control (Reuse wiring and valve)

Make Up Air Unit MAU-1

- Space Temperature (New Sensor and reuse wiring)
- Supply Air Temperature (New Sensor and reuse wiring)
- Damper Open/Close (Reuse actuator and wiring)
- Evap Cooler Enable /Disable (Reuse wiring and relay)
- Drain and Fill Valve Open/Close (Reuse wiring and relay).
- Hot Water Valve Control (Reuse wiring and valve)
- MAU-1 Status (Reuse wiring and current switch)

Cooling Tower and Heat Exchanger

- Outside Air Temperature (New sensor and reuse wiring)
- CDWS Temperature (New sensor and reuse wiring)
- CDWR Temperature (New sensor and reuse wiring)
- Pump P1 Start/Stop (Reuse wiring and relay)
- Pump P2 Start/Stop (Reuse wiring and relay)
- Pump P1 Status (Reuse wiring and current switch)
- Pump P2 Status (Reuse wiring and current switch)
- Panel Alarm Light and Horn (Reuse all panel relays and wiring)
- Cooling Tower Fan Start/Stop (Reuse relay and wiring)
- Spray Pump Start/Stop (Reuse relay and wiring)
- Hot Water Valve Control (Reuse valve and wiring)
- Cooling Tower Scroll Damper (Reuse actuator and wiring)
- Cooling Tower Bypass Valve Control (Reuse valve and wiring)

Other systems included:

- Domestic Boiler #1 Status (Monitor switch inside boiler, new wiring)
- Domestic Boiler #2 Status (Monitor switch inside boiler, new wiring)
- Domestic Hot Water Pump #1 Status (New current switch and new wiring)
- Domestic Hot Water Pump #2 Status (New current switch and new wiring)
- Domestic Hot Water Supply Temperature (New Strap On sensor and wiring)
- Domestic Boiler #1 Flame Failure (Monitor contacts inside boiler and new wiring)
- Domestic Boiler #2 Flame Failure (Monitor contacts inside boiler and new wiring)
- Heat Exchanger Water Supply Temperature (New Strap On sensor and wiring)
- Heat Exchanger Water Return Temperature (New Strap On sensor and wiring)
- Low Level Alarm from Glycol feeder (Monitor existing contact in Glycol feeder and new wiring)

Also Included:

- **Relay interface between MAU and 10 exhaust fans.**
- IP drop for internet access
- Any hubs, switches, and port-forwarding routers as required
- Internet access (Provided by Mountain Broadband)
- 5 year warranty on labor and parts

Not included that might require additional work:

- 2 Automatic actuators for the MAU and Boiler loop.
- 1 Automatic actuator for the MAU front louver

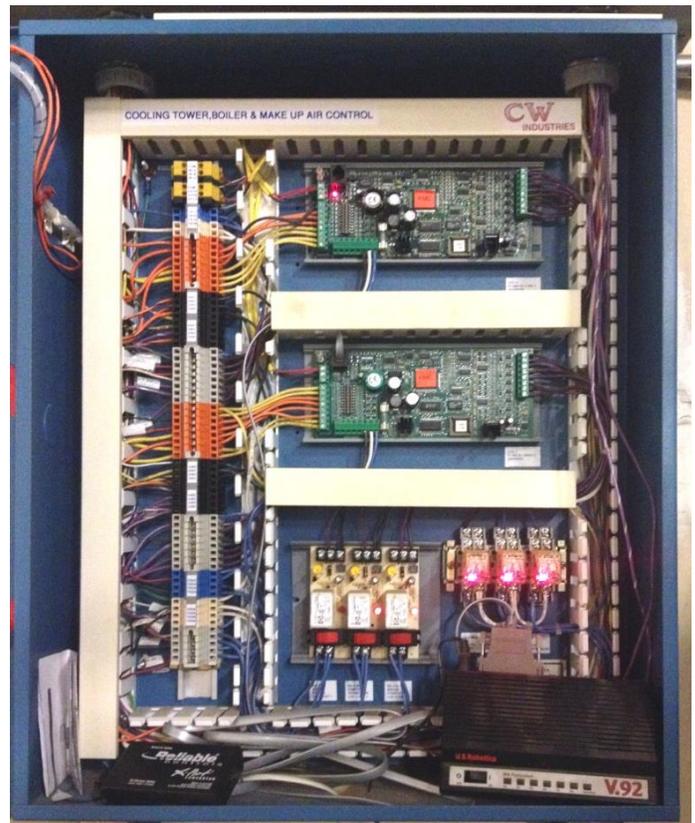
Three bids received:

Johnson Controls	\$ 38,770
Automated Building Solutions	\$ 25,300
Williams Management:	\$ 13,500

From Manager's Report of July 26, 2016

CW Industries Control System

This panel coordinates the boiler, the cooling tower and the make-up air unit as well as various pumps and valves related to the proper operation of the HVAC system. Back in the day there was remote monitoring available to outside technicians (the small plastic boxes at the bottom). This means someone could log-on and see in real time how the various components were functioning. Presumably, adjustments to the programming could also be done remotely. For whatever reason this capability was abandoned (maybe because of the long outdated dial-up technology used). This was my initial motivation in contacting the manufacturer of this system, CW Industries. (I wanted to be able to log-on myself). There were also a number of other issues related to this system that I felt should be addressed. I enumerated them in an email to this company, asking for an estimate for the cost to provide these modification or upgrades:



- System appears to be set up for remote automation. What will it take to get that working.
- Tweaking of settings and programming to save energy. the boiler runs full-on all summer long and I think that's a huge waste. I plan to turn the boiler off manually in the summer but in transition periods (Spring and Fall) the system should be smart enough to run the boiler only when it is needed. (There are other energy saving fine tuning that can be applied, I've been told, for example...

- Take control of the boiler away from the boiler itself. This will allow monitoring of the temperature of the outside air and building circulation to adjust set points on the boiler to match with demand and environmental factors. Right now the boiler runs a rather dumb on-full-blast/full-off sequence.
- Check the programming for logic errors. I think there are periods when it is trying to do two opposite things at the same time and the boiler's safety trips – then it is off line until someone goes up to the roof and turns it back on. This has been an on-going problem for many years.
- I want to upgrade the filters in the MAU and would like to install a differential pressure sensor in the air stream to alert when a filter change is actually needed by measurement rather than with a random schedule, and it would be great if it had remote monitoring capability as well.
- Water during the cooling mode in the MAU does not turn off in a timely manner, ultimately running onto the roof like a hose with the valve left open. This also causes the filters to get overly soggy and droopy, and eventually they fall out of their holders to the bottom of the unit.
- Finally I want to know if CW Industries is our go-to people for service with reasonable response time if the system goes down and we need service.

After over 20 phone contacts over the last three months to this company I could get exactly zero of the above issues answered except for the last one. For whatever reason, I don't think these people are actually capable of doing anything to this system at all, including upgrading or programming or servicing in any way. This means the only option is to buy a completely new system. Doing this before it breaks down would be beneficial as there would be time to make an informed decision, rather than go into emergency mode when there is a sudden failure and be forced to take whatever we can get in a hurry.