

BRP MARINE PROPULSION DIVISION



EXISTING CONDITION

This facility tests, develops and manufactures its own motors at this facility. Testing involves running motors in 600,000 gal of water and capturing the exhaust stream for oxidation.

The challenge was to capture the heat off the oxidizer system and replace existing MUA units around the plant while maintaining plant comfort and manufacturing temperature tolerance.

HEAT CAPTURED OFF REGENERATIVE OXIDIZER TO HEAT PLANT & REPLACE MUA UNITS

All the heat from this oxidizer was vented to atmosphere and wasted. A heavy steel heat exchanger was designed to capture the approximately 22,000 scfm flow with minimum static drop. Two fans drive the system with the 40hp fan designed to maintain discharge air temps by varying outside air flow rates. The second fan was designed to balance flow and not affect the oxidizer blower.

EXHAUST MODULATION CONTROL IN PLANT

Three areas of the plant were changed to save energy and take advantage of the new system. Two process areas had VFD's added to match demand with the fans. This eliminated one MUA system entirely. The third system on a wash line using 100% inside air to blow off parts. A control package was integrated to blend inside and outside air to maintain temperatures. This cut inside air 75% by average during the heating season.

RTU ROOFTOPS REPROGRAMMED TO TAKE ADVANTAGE

The 12 RTU's already had VFD's and a new BAS system that was programmed to modulate the heating cycle. The new waste heat recovery has eliminated the two main MUA systems entirely. Total consumption of the twelve RTU's that were heating over 400,000 sqft, is now only costing \$300 per month to operate. Its primary function is now just mixing air.



THERMS PER MONTH BASED ON RECOVERY ALONE

DATE	2014	2015-16	SAVINGS
12/1/15	55,035	34,718	\$ 12,190
1/1/16	63,505	35,158	\$ 17,008
2/1/16	81,578	62,643	\$ 11,361
3/3/16	78,196	51,064	\$ 16,729
4/2/16	74,106	41,615	\$ 19,494

FIVE MONTH SAVINGS: \$76,333

Note: Savings based on an averaged 5 year cost of \$.60 per therm

MUA CONTROL INTEGRATION TO BAS WAS ADDED TO TAKE ADVANTAGE OF NEW SYSTEM

The existing MUA system that was new was not monitored and had no visibility. Adding the unit to BAS showed that the unit was not modulating and was running during un-occupied times at maximum capacity. The integration immediately spotted the problems that were corrected and the MUA now modulates to maintain pressure and only runs as needed. The new system was enough to turn the units off.

CO-INCIDENT KWH SAVINGS FROM RTU 1-12 DUE TO LOWER OPERATION LOADING

DATE	2014	2015-16	SAVINGS/MONTH
12/1/15	936,930	877,800	\$ 5,950
1/1/16	930,810	783,780	\$ 14,796
2/1/16	1,061,910	933,060	\$ 12,966
3/2/16	1,016,370	950,460	\$ 6,652
4/2/16	1,013,580	910,740	\$13,399

FIVE MONTH ELECTRICAL SAVINGS: \$69,382

Note: Calculations take into account the change in cost due to lower demand charges even after rate increase

Combined 5 Month Saving \$145,716.00



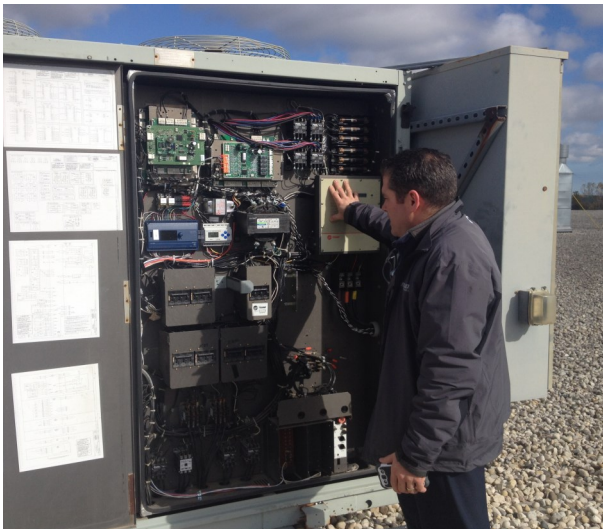
Custom Controls

Tower developed a control strategy that didn't interfere with the existing oxidizer operation and maintained discharge air pressures through the stack. Safety issues were also integrated for fire and low discharge air temps to prevent the system from cooling in the event of oxidizer shut down or failure.

Additional integration allows visibility through the existing new BAS and provided data for temps throughout the plant and heating control of the MUA units.

The MUA units were controlled also to maintain slightly negative building pressure in the areas served. This allowed the units to fully take advantage of the MUA provided by the new system and modulate down based on building pressure

RETURN ON INVESTMENT AFTER **75%**



A new control system with VFD's and automated logic was added to the twelve main air handling units to maximize energy savings. This saved over \$ 700,000.00 vs replacement .

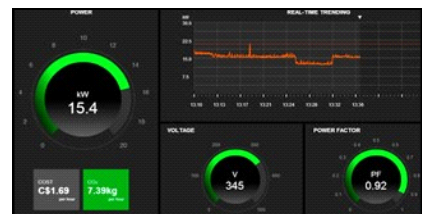
TOWER ENERGY MECHANICAL:

Licensed mechanical contractors with 30+ years of experience.

Licensed master electricians specializing on controls.

Practical customized engineering experience to spot opportunities and estimate payback and costs.

Real Time Monitoring and Control:



Real time monitoring and controls spot problems in the BAS and plant operations based on energy usage not just performance. Usage spikes out of the norm indicate equipment or control malfunctions long before they would normally show up on the utility bill.

Other issues concerning parts failure are also spotted in advance preventing costly maintenance.