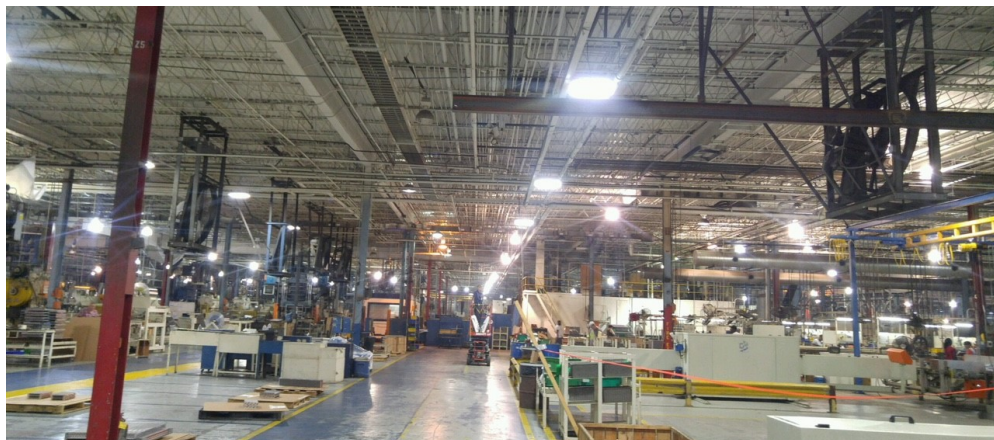




## INDUSTRIAL CASE STUDY

# MODINE MANUFACTURING CO. ENERGY UPGRADE



### Existing Condition

The lighting in these plants was a combination of HID and T8 technology which was inefficient and expensive to maintain. The lighting also was inadequate and needed to be improved.

The compressed air system was in disrepair and had no modern controls to reduce usage. There was also no heat recovery that could be used to heat the facility in the winter.

### OVER 1.9 MILLION SQ.FT INSTALLED OVER 4 LOCATIONS

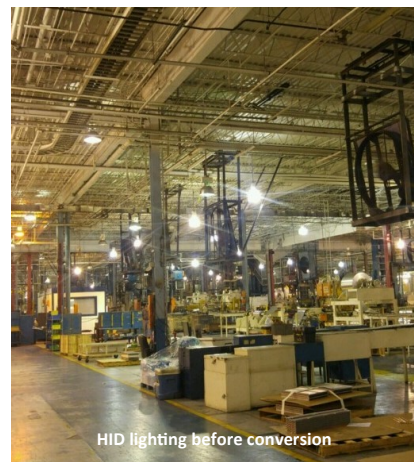
Thousands of fixtures were removed, relocated and upgraded with plugs and outlets as needed. With the change in use over the years almost 50% of the plant was over lit and the other 50% under lit. Fixtures were moved, raised, lowered and adjusted as needed to meet the new manufacturing requirements during the installation. Almost five hundred redundant fixtures were removed to save more energy. Some locations saw a 35% reduction in energy use for the entire plant.

### Task Lighting Converted

Fixtures over machines used for task were converted to LED while using the old shell and fixture. This lowered installed cost and eliminated the need for shatter guards since the fixtures were not glass. Yellow covers were also eliminated which made the new system twice as bright without adding cost or additional energy.

### Office Lighting Replaced at OEM

The existing office lighting was designed in the 50's when offices used manual entry and there were no computer monitors. The fixtures were also yellowed and in poor condition. After the acquisition an upgrade was implemented to modernize the look and upgrade the lighting to a non glare computer friendly appearance. LED flat panels lowered the wattage from 156W to 38W and nearly doubled the output from the deteriorated existing fixtures.



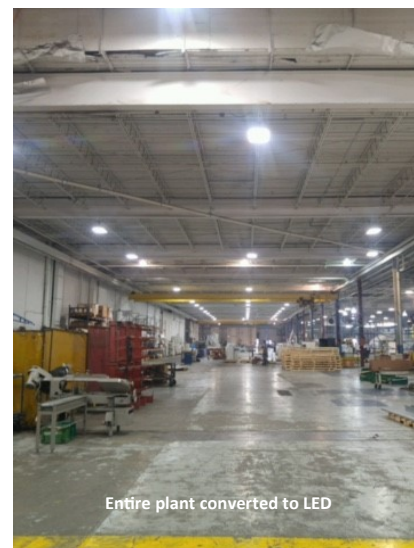
HID lighting before conversion

### Average Electrical Saving

Unit	Monthly	Yearly
Kwh	\$60,990	\$731,887
Maintenance	\$8,630	\$103,567

**10 yr Savings \$ 9,774,811**

Note: Savings based on current cost of power.



Entire plant converted to LED

Tower Energy International LLC.  
2425 S. Memorial Dr. Racine WI 53403  
(262) 632-1464 support@towerenergypartners.com www.towerenergypartners.com

## COMPRESSED AIR UPGRADED AT THE GRENADA LARGEST FACILITY

The plant had over 1000hp of compressed air capacity but was still renting an additional 300hp due to it's inefficient operation. Since the plant was just purchased through an acquisition they had no previous control over how the maintenance was handled and what the cost effects were. Tower analyzed the compressed air system and recommended an upgrade to handle plant pressure requirements and cut costs.

### Savings from Compressed Air Upgrade

Unit	Yearly saving	Saving/ Month
Rent	\$ 96,000	\$ 8,000.00
KWh	\$ 92,000	\$ 7,600.00
Therms	\$ 52,000	\$ 5,250.00

**Projected Yearly on compressed air:** \$ 240,,000.00

Note: Project was starting and savings were accelerated during progress

**Combined Yearly Saving** \$ 1,054,000

**Combined Project Yearly ROI**

**10 Year Projected Saving**



Radiator clogged causing overheating

**92%**

**\$ 12,331,800 .00+**

### New 300hp VFD Compressor Added

Tower specified a 300HP VFD compressor to modulated with the upper end load of the plant. The remaining fixed speed compressors were then staged to carry the base load to 100% of capacity which is very efficient. As the load was not needed the base line compressors would stage to off allowing the new compressor again to modulate.

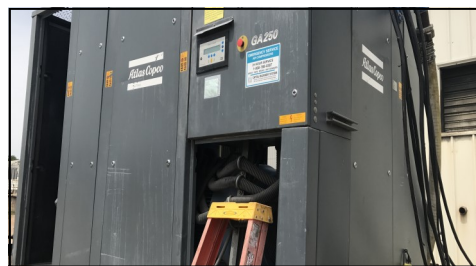
### Compressed Air heat recovery

The existing system was expelling all the heat to the outside all year. Plant heating however even though it was on the south was substantial due to the size of the plant and relatively loose building envelope. The new compressor was installed inside to take advantage of a simple heat recovery in winter by just expelling the heat above the unit. This will save approx. 83,000 therms throughout the heating season.

### Compressed Air Use Efficiency:

A plant operational process was looked at for ways to reduce energy with compressed air. Operational start-up and shut down procedures were implemented to not have air on when machines were not running. A full scale leak detection / repair system was also implemented to reduce waste. This cut compressed air requirements close to 150HP.

### Compressed Air Rental Stopped



With the existing system running so inefficiently the plant had to rent a compressor at a cost over \$ 8,000.00 per month. The combined savings in energy savings, rental costs and maintenance paid for the new compressor in 1 year.

The existing storage system was also in disrepair causing the baseline compressors to run when not needed. These parts were repaired during the process.



New 300HP VSD compressor was added inside the plant to take advantage of heat available in winter without added expense to facilitate. In summer the warm air is exhausted through open doors and a whole plant ventilation system.