

MIIAC Helps *Teledyne* Reduce Energy Consumption by 25%

The University of Miami Industrial Assessment Center (MIIAC) performed an energy audit at Teledyne Oil & Gas manufacturing plant in Daytona Beach, FL in July 2019.

The company was presented with a detailed report with recommendations in September 2019.

The company management has expressed their interest in the analysis of all recommendations. Six months later, the company had already implemented 63% of the recommendations, which resulted in energy savings of 25%.



Dr. Ramin Moghaddass, the Director of MIIAC (middle), and a team of graduate and undergraduate students at one of the assessments.

Team Members

The visiting team members consisted of the Assistant Director Dr. Ramin Moghaddass and students from the University of Miami College of Engineering led by the late Dr. Shihab Asfour, the Former Director of MIIAC. The Lead student, Ibrahim Ahmed and 4 other graduate students were on the field visit and they participated with five more students in the analysis and writing of the report.

Summary

As a result of the assessment and the following analysis, the team identified eight (8) opportunities for saving energy. Upon implementation of all of them, the company would see a reduction of energy consumption by 1,352,242 kWh of electricity (33% of the annual electric consumption) as well as reduction of peak demand by 1,424 kW. One year after the assessment, the company was contacted again and was found to have actually

implemented a total 5 out of 8 recommendations with implementation rate of 63%. Actual cost savings were estimated to be **\$60,303** which corresponds to **25%** of the company's annual energy bill. The company reduced their energy consumption by **1,136,070** kWh annually. The total average payback was 2 years.

Plant Description

This plant covers an area of 156,000 sq. ft. divided into various production and administrative sections. The company has 345 employees onsite. The plant operates 6 days a week and 20 hours per day for 52 weeks per year for total annual hours of 6,240. The plant processes around 9,600 units annually of electrical and fiber connectors that are mainly used in deep water oil and gas exploration equipment.

Major equipment includes two 50-HP rotary screw air compressors and 42 DX units for HVAC with 21 air-handling units.

Assessment Strategy

The audit team spent one full day at the plant during which they toured the entire facility, identified possible opportunities for energy savings, collected several measurements, and deployed electrical loggers for longer-term analysis. Two weeks later, the loggers were retrieved

Savings equivalent to:

- *CO2 emissions from:*

- 147 passenger cars driven for 1 year OR,
- 76,538 gal of gasoline consumed
- 78.5 homes' energy used for 1 year OR,
- 86,746,162 smartphones charged OR,

- *Greenhouse emissions avoided by:*

- 231 tons of waste recycled instead of landfilled OR,
- 0.15 Wind turbine running for 1 year OR,
- 25,840 Incandescent lamps switched to LED OR,

- *Carbon sequestered by:*

- 11,247 tree seedlings grown for 10 years OR,
- 4.6 acres of US forests preserved from conversion to cropland in 1 year.

for analysis. Prior to the audit day, a pre-assessment was performed in which the center analyzed copies of the company's electric bills for the past 12 months. It was found that the company was being charged on average \$0.04 per kWh and the peak demand charge was on average \$13.31 per kW. This was the cost used in estimating total projected savings.

Data Analysis

The team utilized temperature and electric data loggers with current transducers (CTs) to perform power profiles of both air compressors and HVAC equipment. On the day of the assessment, two students performed an extensive compressed-air leak detection using an advanced ultrasonic leak detector. Thermal images and air flow measurements were taken using an infrared camera and air flow meter. Students showed outstanding skills in using instruments in addition to scientific professionalism and attention to details. Back at the center, students used in-house-developed package to analyze electric data and used the DOE’s AirMaster+ software to simulate the company’s compressed-air system. An excel tool was used to analyze the lighting system which was also developed in house.

Remarkable Results

During the assessment, it was observed that the compressed air system was running at a high pressure set point (125 psi). The team recommended to gradually reduce the pressure set point by a maximum of 15 psi. A conservative calculation of savings was estimated at \$2,612 which corresponds to 15% savings of the cost of running the compressor with a simple payback of 0.06 years.

At the follow-up implementation survey, the company management reported a sky-high savings of 56% after they reduced the pressure set point to 114 psi. This means the company has achieved approximately an extra \$7,000 on top of the estimated savings.

Other recommendations included upgrade of existing lighting to LED, upgrade of

some HVAC equipment, turning-off power after operating hours and sealing off gaps where cooled air was escaping.

Company Feedback

The company was very receptive of the suggested recommendations and were extremely delighted with the presented report. The report was in line with the company’s strategy of continuous improvement and their attempt to go green. This was part of the company’s response to the lead student at the final report presentation:

“We enjoyed working with you and your colleagues and appreciate the hard work and effort that was put forth.”

Implemented Recommendations

| Assessment Recommendations | Annual Resource Savings | Total Annual Savings | Capital Costs | Simple Payback |
|--|-------------------------|----------------------|------------------|----------------|
| Replace Existing HVAC Units with More Efficient Ones | 326,339 kWh/yr | \$20,647 | \$100,030 | 4.84 years |
| Turn off all Unused Equipment During Non-Working Hours | 389,952 kWh/yr | \$17,548 | \$3,600 | 0.21 years |
| Replace Fluorescent Lighting with LED | 159,819 kWh/yr | \$11,278 | \$17,214 | 1.53 years |
| Reduce Pressure Set point by 15 psi | 215,226 kWh/yr | \$9,685 | \$160 | 0.02 years |
| Minimize Compressed-Air Leaks | 18,035 kWh/yr | \$1,145 | \$1,980 | 1.73 years |
| Total | 1,109,371 kWh/yr | \$60,303 | \$122,984 | 2 years |