

Oil Additive and Capacitors installed at Colorado Meat Packers

Cast of Characters

Xcel Energy is the predominant gas and electric utility in Colorado (among other states). They have several rebate programs to encourage their customers to alter their electric usage so as to decrease the overall draw on Xcel's generation and transmission systems. Xcel Energy practices Demand Side Management, or DSM, through a program called Custom Efficiency.

This rebate program is managed by an independent company, Nexant. Nexant takes pre-and post- readings to determine the energy saved by various treatments; thus they become the catalyst for rebates going to the end customer (or not, depending on the outcome of the readings and subsequent analysis)

Colorado Meat Packers (CMP) is a Denver-based company that has a 38,000 square foot meat packing plant. CMP processes roughly 300 carcasses (mostly cattle) daily. Part of their facility is refrigerated to 0 degrees. The storage areas are kept at 32 degrees year-round, while the production area is kept at 40 – 45 degrees. As such, their electric load is predominantly refrigeration.

They have 14 refrigeration/evaporation/freezer units that draw roughly 300 KW--or an average of 168,000 KWH/month—with a low of 144,000 KWH in March to a high of 207,000 KWH in July.

The purpose of the test was to determine what (if any) savings can be realized by treating the facility with capacitors (called EasiLiners) and Polarized Oil Additive (called Frigi-Tech). The manufacturer states that these treatments reduce average KWH (and Peak KW) by 8% for each of these two techniques. Thus, for Air Conditioning/Refrigeration units, they state there will be an average of 16% savings (8% by the treating the compressor with Frigi-Tech, 8% by treating the motor with an EasiLiner). The test was designed to show the efficacy of two treatments marketed by Energy Automation Systems, Inc. (EASI) and its Denver distributor, Energy Technologies.

The ultimate objective was to determine if these treatments decrease peak KW during Xcel's critical hours of 3 p.m. to 7 p.m. Monday through Friday, August through September; thus potentially qualifying the customer for rebates from Xcel Energy.

The Test

On October 22, 2004, Nexant installed measuring devices at CMP's facility. The purpose of these measurements was to establish a baseline on two of CMP's refrigeration units. The units are virtually identical:

- Trenton Refrigeration Units of approximately the same age
- 15 HP
- 3 phase
- 480 V
- RLA of 59.6 amps

Reciprocating compressor

Using R-22 refrigerant.

They are within 10 feet of each other and refrigerate the same area of the plant.

They are each approximately 150 feet from the panel and each is on its own circuit

The North Unit, (or Control Unit A) is the one that gets treated, and the South Unit (or Control Unit B) is the control unit that is not treated (until after the measurements are complete). The measuring devices are duplicated on each unit and consist of:

- A datalogger was installed at the panel to capture the KW, PF, KWH, Amps, Volts, KVA and KVAR for each of the two compressors.
- Two temperature loggers were installed on each of the two compressor units. This gives us Delta T.
- These readings were taken every 15 minutes. It was also noted whether or not the compressors were running at the 15-minute snapshot.

These devices remained in place for six weeks:

- On October 22, 2004 to November 8, 2004, Nexant installed the two devices (times 2) mentioned above.
- On November 18, a polarized oil additive—called Frigi-Tech—was injected into the compressor of Control Unit A (It was also installed in all other refrigeration units except for Control Unit B). This was done by a Class 1 licensed HVAC engineer from Tolin Mechanical. Two weeks passed, then
- On November 23, a capacitor—called an EasiLiner— was installed on Control Unit A (Over the course of the week, they were also installed on all other refrigeration and motor units in the plant, except for Control Unit B). This was done by a Master Electrician from Tolin Mechanical. Two weeks passed, then
- On December 6, 2004, the measuring devices were removed. [At that time, instantaneous amperage readings were taken on all the compressor motors with and without capacitors. The compressor that was treated—Control Unit A--showed a 16% decrease in amperage when the capacitor was in the loop.]

The information from the capture devices was then uploaded and analyzed by Nexant. The results follow; details are attached:

| | <u>No</u> | | <u>F-T</u> |
|---------------------|-------------------|-------------------|-----------------------|
| Power Factor | <u>Treatments</u> | <u>Frigi-Tech</u> | <u>&EasiLiner</u> |
| Untreated | 0.44 | 0.45 | 0.43 |
| North Treated | 0.45 | 0.42 | 0.54 |
| % Difference | 2% | -7% | 26% |
| | <u>No</u> | | <u>F-T</u> |
| KWH | <u>Treatments</u> | <u>Frigi-Tech</u> | <u>&EasiLiner</u> |
| Untreated | 3.23 | 3.41 | 3.24 |
| North Treated | 3.31 | 2.95 | 2.73 |

| | | | |
|-------------------------|-------------------|-------------------|-----------------------|
| % Difference | 2% | -13% | -16% |
| KW | <u>No</u> | <u>Frigi-Tech</u> | <u>F-T</u> |
| | <u>Treatments</u> | | <u>&EasiLiner</u> |
| Untreated | 12.93 | 13.64 | 12.96 |
| North Treated | 12.56 | 11.81 | 10.93 |
| % Difference | -3% | -13% | -16% |
| Compressor Hours | <u>No</u> | <u>Frigi-Tech</u> | <u>F-T</u> |
| | <u>Treatments</u> | | <u>&EasiLiner</u> |
| Untreated | 0.82 | 0.92 | 0.91 |
| North Treated | 0.84 | 0.69 | 0.66 |
| % Difference | 2% | -25% | -27% |
| Delta T | <u>No</u> | <u>Frigi-Tech</u> | <u>F-T</u> |
| | <u>Treatments</u> | | <u>&EasiLiner</u> |
| Untreated | 135 | 146 | 151 |
| North Treated | 167 | 122 | 119 |
| | 24% | -16% | -21% |

What the data from the experiment reveals:

- Week 1 and Week 2 had no treatments. There were no appreciable difference in the readings taken on each of the two compressors. This shows that the comparison between the two is valid and working

Week3 added Frigitec

- Power Factor did not change (one would not expect it to)
- KWH decreased 13%, as did KW
- Compressor hours showed a 25% decrease
- Delta T showed a 16% decrease

Week5 added an EasiLiner (also, Frigitec continued to cycle through the compressor, reflecting an even greater impact)

- Power Factor increased by 26% thanks to the EasiLiner
- KWH and KW showed a 16% decrease—this goes right to the customer’s electric bill. This 16% drop is identical to the decrease in amperage that was shown when instantaneous readings were taken with and without the capacitor in the loop
- Compressor hours showed a 31% decrease
- Delta T decreased by 21%.

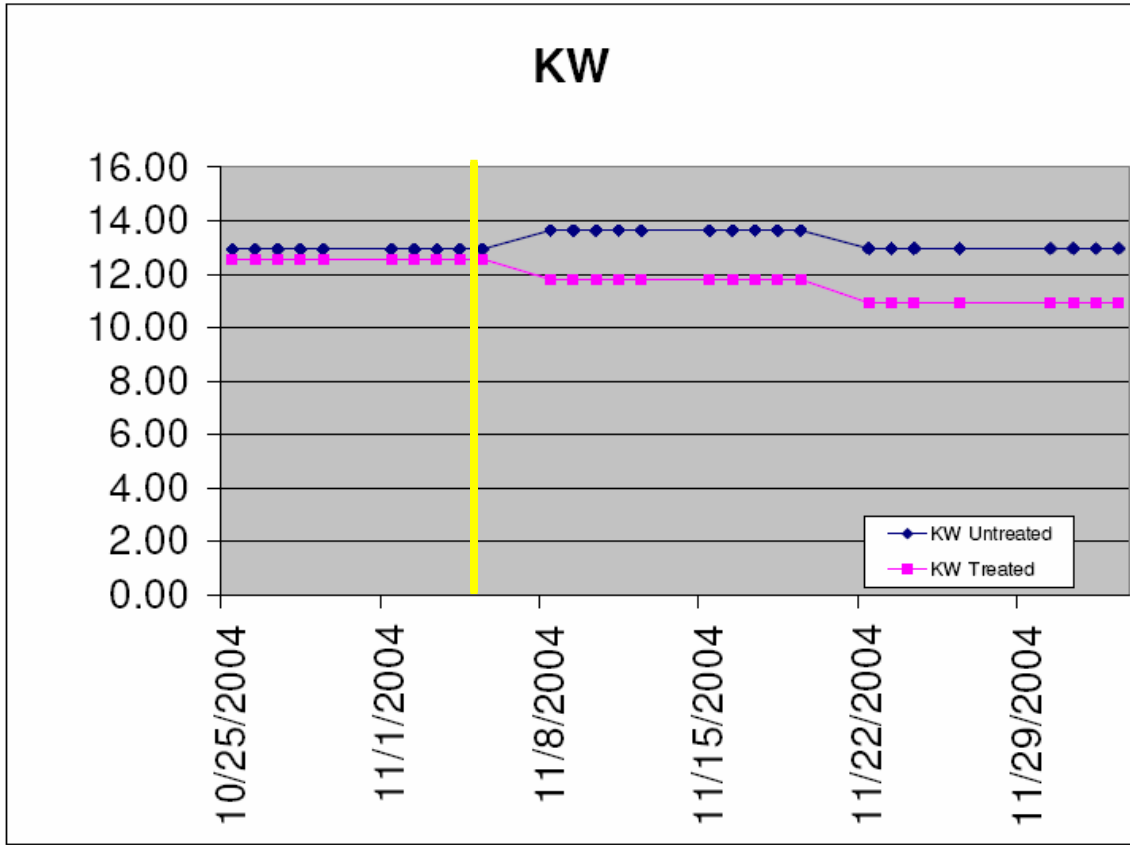
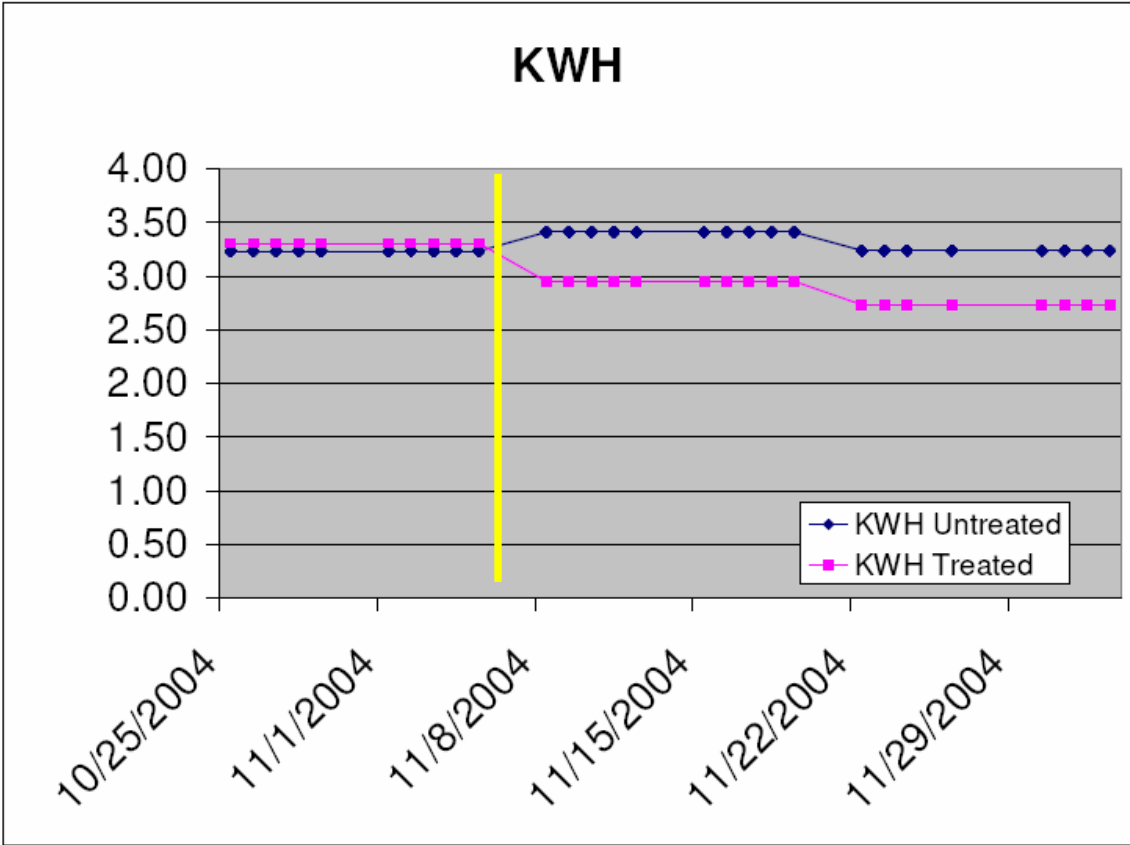
Summary

By the 6th week, the combined effect of the two treatments is a 17% decrease in KW and KWH, which means that it costs 17% less to run that compressor

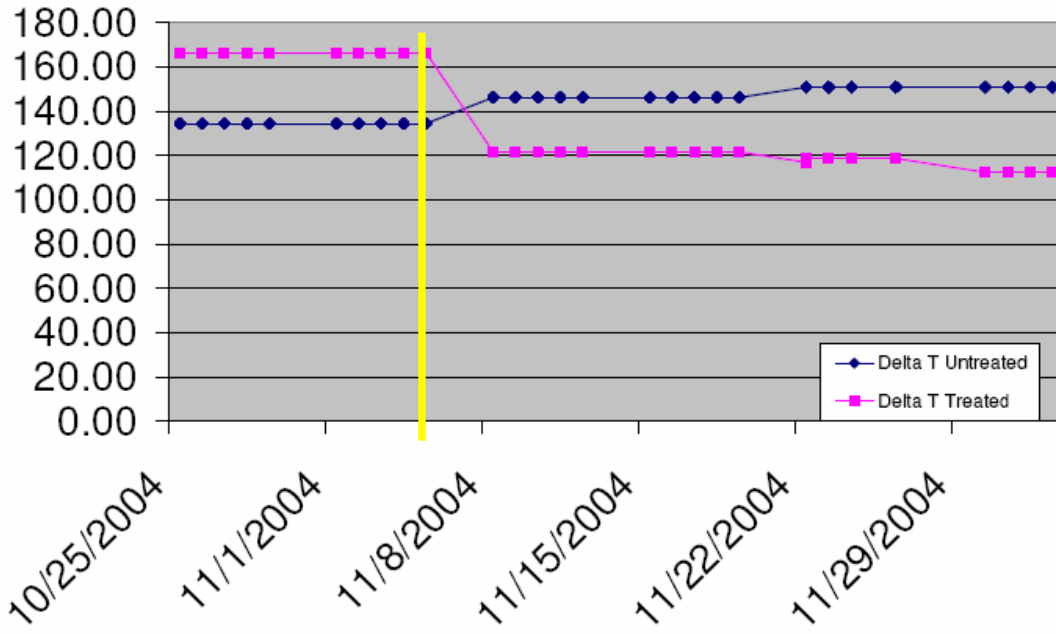
Compressor hours decreased by 29%, meaning that the motor doesn’t have to work as hard—this will extend motor life and decrease maintenance.

Delta T dropped by 24%, showing that the motor is running considerably cooler—this too will extend motor life.

This test shows a side-by-side comparison of the impact of Frigi-Tech and an EasiLiner and verifies the manufacturer's claim that these treatments reduce KWH (hence the customer's electric bill) and increase motor life by causing the motor to run cooler and that the compressor motor runs for fewer hours when treated with these technologies.



Delta T



Compressor Hours

