

LOCKHEED MARTIN ENERGY HEAVY INDUSTRY ENERGY EFFICIENCY PROGRAM

WE NEVER FORGET WHO WE'RE WORKING FOR

Goals: Reduce the energy needed to cool the injection and extrusion machines

Strategies: Replace the air-cooled chillers with water-cooled chillers, upgrade the chilled water pump system

Benefits:

- **Total Energy Savings:**
2,132,005 kWh annually
- **Peak Energy Savings:**
288.75 kW

Equipment Installed:

- **Carrier 30HXA096 100 ton water-cooled chiller**
- **Carrier 30HXA136 150 ton water-cooled chiller**
- **Evapco PMC-889E evaporative condenser**
- **(2) 15 HP chilled water pumps**
- **Properly sized piping for the chilled water header**

Chiller & Chilled Water Loop Retrofit



The customer site presented in this case study is the premiere provider of drip irrigation tape, tubing and related accessories for agriculture companies looking to increase crop yields through efficient water delivery. Their manufacturing facility produces plastic drip tubing and parts on injection molding and extrusion machines.

The heads of the injection and extrusion machines are cooled using air-cooled process chillers. The facility previously had two chilled water loops, one chilled water loop served the extrusion machines and the other chilled water loop served the injection molding machines. Two (2) 75 ton air-cooled chillers served the molding chiller water loop, and three (3) air-cooled chillers served the extrusion chilled water loop. Of the three (3) that served the extrusion loop, one was rated at 110 tons and the other two (2) rated at 40 tons.

The facility also utilized four (4) chilled water pumps, two (2) chilled water pumps serve the extrusion and molding loop, with 30 hp motors operating constantly. Each chilled water loop also had a separate 10 hp circulating pump that transferred water from the holding tank to the chillers for cooling. The chilled water header and piping however were undersized for the amount of chilled water flow required by the facility.

Continue on reverse....

The old process chillers suffered from a number of inefficiencies. They were operating at high condensing pressures, which increased the energy consumption of the chillers for cooling. Mixing the chilled water, supplied by the chillers, with the chilled water in the tank resulted in higher chilled supply temperatures. They were also very old with poor efficiencies.

Lockheed Martin Energy engineers conducted an audit on the chilled water system and replaced the air cooled chillers with two water cooled screw chillers. An oversized evaporative condenser was also installed to provide condensing temperatures close to the outdoor wet bulb temperature. The chilled water return tanks were also raised six feet above the chilled water pumps, providing gravity fed water through the pipes. Properly sized piping was also installed and the four (4) 30hp chilled water pumps were replaced with two (2) properly sized chilled water pumps rated at 15 hp.

Implementation of these measures saved 2,132,005 kWh annually, corresponding to a cost savings of \$234,521 yearly. These savings made the simple payback period only 0.5 years!

Financial Analysis:

- **LME Paid Incentive:**
\$348,676.01
- **Energy Cost Savings:**
\$234,521 annually
- **Simple Payback In:**
0.5 years

Project Team:

- **Pacific Gas and Electric Company**
- **Lockheed Martin Energy Heavy Industry Energy Efficiency Program**

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It is our objective to assist PG&E heavy industry customers in:

- Improving their competitive position
- Identifying process-focused energy improvements and other opportunities (e.g. demand response)
- Facilitating electricity and natural-gas energy efficiency equipment and demand reduction upgrades
- Reducing Operating costs per unit of product
- Improving product quality and production rate
- Reducing waste, pollutants, and Green House Gas emissions

**Remember that increased production efficiency = lower production costs
= increased profits**

The Heavy Industry Efficiency Program is managed and facilitated by Lockheed Martin Energy (LME) and is funded by California utility ratepayers, under the auspices of the California Public Utilities Commission. The program objective is to identify and facilitate the implementation of major process-orientated and other energy-efficiency upgrades for PG&E's heavy industry customers. Customers that install energy efficiency systems receive incentives based on the annual kWh or therm saving achieved.