MIDWEST CHP APPLICATION CENTER

In Partnership with the US DOE

NiSource Energy Technologies
A NiSource Company

combined heat & power in industry

Manchester Tank
70 kW CHP Application

Project Profile

Quick Facts

Location:
Elkhart, Indiana
Facility Type:
Manufacturing Facility
Manufacturing Product Type:
Low-Pressure Vessels
Maximum Electric Demand:
700 kW
CHP Generating Capacity:
70kW
Prime Mover:
MT70 Ingersoll Rand Microturbine
Primary Fuel:
Natural Gas
Heat Recovery Type:
540,000 Btu/hr Direct Exhaust (450°F)
Heat Recovery Application:
Powder Coat Curing Oven
CHP System Efficiency:
70-75% Design Efficiency
Operation Schedule:
On Peak Only
Local Electric Utility:
American Electric Power (AEP)
Total Installation Cost:
$183,254 (includes backup generator)
Began Operation:
March 2005

Project Overview

In March 2005, Manchester Tank of Elkhart, Indiana began the operation of a 70 kW microturbine combined heat and power system. The CHP system, designed and installed by NiSource Energy Technologies (NET), a subsidiary of NiSource, incorporates an MT70 Ingersoll Rand microturbine for the prime mover and recovers the 450°F direct exhaust from the microturbine to supplement the 400°F heating requirements of Manchester Tank's powder coat curing oven process. The CHP system operates during the plant's peak hours of operation coinciding with the utility's on-peak period to maximize the CHP system's optimal efficiency and offset on-peak electric charges.

Manchester Tank Plant - Elkhart, India

Plant Characteristics present CHP Opportunity

Manchester Tank is responsible for the fabrication and finishing of high-quality steel vessels designed for the containment of low-pressure gases of various industrial applications. Each tank, after fabrication, is put through a finishing process that includes a wash cycle, dry-off cycle, powder coat application, and cure cycle.

- The plant's electric loads include various steel processing machinery and welding equipment along with blowers and miscellaneous electric devices associated with the tank finishing processes.
- The thermal loads of the plant include the annealing process, heating of the wash tank solution, firing of the radiant tube heaters in the dryoff oven, and the operation of a direct-fired burner at the cure oven.
- The line operation schedule is 50-60 hours per week, operating each weekday beginning at 5:00AM.
- The plant experiences an on-peak baseload electric demand of 400 kW between 6:00AM and 10:00PM and an 85 kW off-peak baseload demand.
- Recent power outages resulting in lost production also prompted Manchester Tank to evaluate installing a backup power source as part of the complete CHP energy solution.

CHP Energy Solution at Manchester Tank

Given the existing electric and thermal loads, the potential for energy savings and improved power quality and reliability, Manchester Tank realized the opportunity for a combined heat and power application and sought out NET to design and implement the integrated energy system.

- Contrary to a system designed to meet a plant's entire electric load, NET recommended a 70 kW baseload operating CHP system to ensure 100% of the heat generated from the microturbine could be recovered and utilized by the plant ensuring optimal efficiency of the CHP system.
- The 450°F microturbine exhaust gases are routed to the powder coat curing oven to supplement the 400°F powder coat curing process, satisfying a portion of the curing process heating requirements.
- In addition to identifying and matching the specific thermal and electric loads, NET designed the system to be in close proximity to the electric distribution panel, the gas supply line, and the powder coat curing oven to minimize installation costs.
- An Ingersoll Rand N130 natural gas fired, reciprocating engine backup generator was installed as part of the integrated energy system to supply power to critical loads in the event of a power outage. Manchester Tank's computer systems, lighting and annealing furnace control system will all remain operational in the event of a blackout due to the integrated energy system installed by NET.

Convection Cure Oven

MT70 Ingersoll Rand Microturbine

Financial Incentives

- This project qualified for a $30,000 award from the Indiana Department of Commerce, under the Distribution Grant Program to offset equipment costs.
- The project met necessary qualifications to be included in a larger US DOE program focusing on Distributed Generation demonstration projects, offsetting $90,000 of total project costs.
- Not accounting for any state or federal funding, the total project costs were approximately $2,600 per installed kW. Accounting for the CHP system only, the project costs were approximately $1,700 per kW. Incorporating the CHP system, the backup generator installation and all funding, the cost per installed kW was approximately $930.

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State and Federal Funding Incentives resulted in installation costs of $930/kW

Cure oven experienced 30% reduction in fuel consumption due to heat recovery

Awarded 2005 CHP Certificate of Recognition by EPA