



New York State Energy Research and Development Authority

Harbec Plastics

Space Conditioning with CHP

DG/CHP Program

Project Profile

Combined heat and power for Plastic Injection Molding



Quick Facts

Location:

Ontario, NY (RG&E)

Installation Date:

July 2001

Operating Experience:

6 years (as of July 2007)

CHP Equipment:

Twenty-five 30 kW Capstone Micro-Turbines

Generating Capacity:

750 kW

Heat Recovery Application:

Space Conditioning (> 5,000 MBtu/h peak)

Design CHP Efficiency:

>70% HHV

Type of Fuel:

Natural Gas

Annual Utility Savings:

\$125,000 per year (estimated)

Simple Payback:

8 years (estimated)

Overview

Harbec Plastics is a custom injection molding facility located in Ontario, New York. Maintaining space conditions is critical for production and employee comfort. Harbec considered air conditioning the space using electricity from the grid but determined this would be cost prohibitive.

Instead, Harbec installed twenty-five 30 kW micro-turbine generator sets to produce electricity for the plant. Waste heat from the turbine exhaust is used to operate an absorption machine that produces chilled water for space cooling. Hot water is also provided for space heating during the winter months.

The Application

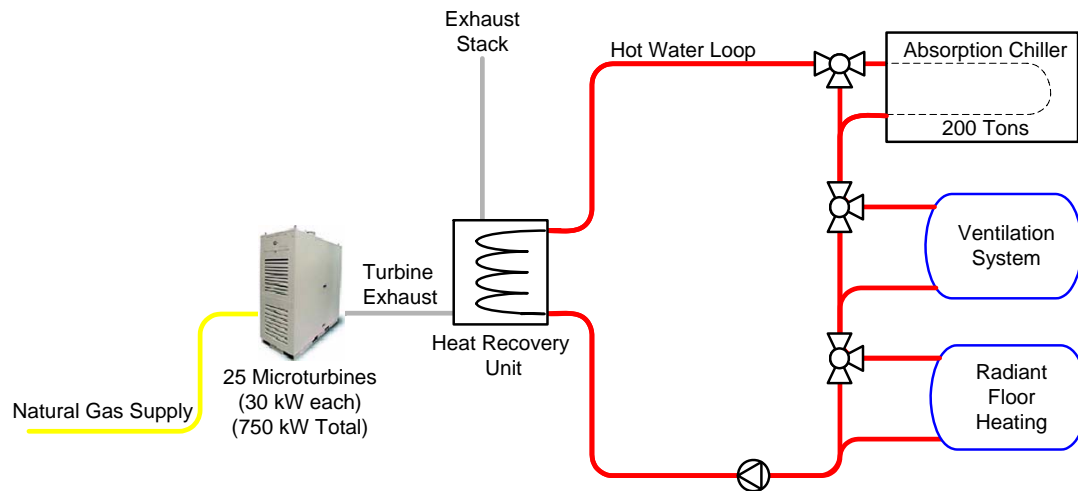
Harbec Plastics operates injection molding machines, CNC machine tools and other manufacturing equipment. The electricity that is consumed eventually dissipates as heat causing the space temperature to increase. No cooling was provided prior to the installation of the CHP system. Heat recovered from the micro-turbine exhaust is now used to produce chilled water in a 200 ton absorption machine. Both the space temperature and humidity level are being controlled. This has alleviated some production issues and reduced the need to dry the plastic feedstock. The CHP plant was installed at the same time an adjoining warehouse was constructed. A radiant floor heating system was included in the warehouse design to provide a winter thermal load for the CHP system in addition to the requirements of the existing manufacturing and office areas.



Micro-Turbine Generators and Heat Recovery Modules

CHP System and Equipment

The micro-turbines have a total capacity of 750 kW. Twenty units provide primary service and exhaust into five separate heat recovery modules that produce hot water at 210°F. Five additional turbines provide reserve capacity and operate without heat recovery. The CHP system is grid paralleled and can operate in either an electric or thermal load following mode depending on the site's requirements. Hot water is circulated through a common loop serving the absorption chiller, existing air handlers and radiant floor heating system in the adjoining warehouse. The electric output can be modulated or exhaust gas can be diverted around the heat recovery units to regulate the thermal output depending on the mode of operation. No auxiliary cooling is required.



Economics and Environmental Benefits

Harbec chose the micro-turbines because of the claimed emissions performance (< 9 ppm NO_x) and redundancy inherent in the modular configuration. Harbec was an early proponent of the technology and felt its use was consistent with the company's commitment to adopt environmentally beneficial practices. The plant efficiency varies by mode of operation but can exceed 70% on a HHV basis. Electricity can be produced at a cost of approximately \$0.074 per kWh with credit for heat recovery compared to an aggregate utility price of \$0.105 per kWh. Hourly data from the site are available on NYSERDA's DG/CHP data system starting from October 2005.



Installed View of Absorption Chiller

Summary of Benefits

- Modular design provides redundancy and operating flexibility
- Low emissions characteristics
- 30% reduction in average cost of electricity

“Despite conventional wisdom, being greener does not mean being more expensive.”

- Bob Bechtold,
President, Harbec
Plastics

Web Links and Further Information:

Northern
Development –
Developer

www.northerndevelopment.com

Energy Concepts –
Engineer

www.nrg-concepts.com

Micro-Turbine
Manufacturer

www.capstoneturbine.com

Other
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Resources

chp.nyserdera.org

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