Canadian Manufacturers & Exporters

Case Study

Load Shifting for Demand Response at Injection Molding Plant

Key Opportunity:

The plant volunteers to reduce its demand during IESO peak demand periods by shifting production to non-peak times.

Savings potential: 300 kW

Expected cost: $50,000

Expected payback: 0.3 years

Applicability: This opportunity is available for large plants that have the capability to shift loads to evening and night shifts. Requires production mix flexibility.

Introduction

Plastic injection molding plants use a variety of different machines to produce various objects. These injection molding machines typically vary in size to match the components they are producing. Due to the imperfect match between customer orders and the production capacity of a given plant, some machines inevitably remain idle from time to time. The plant in this study was interested in shifting this idle time to align with the five yearly peak demand times in order to take advantage of the IESO incentive for reducing demand.

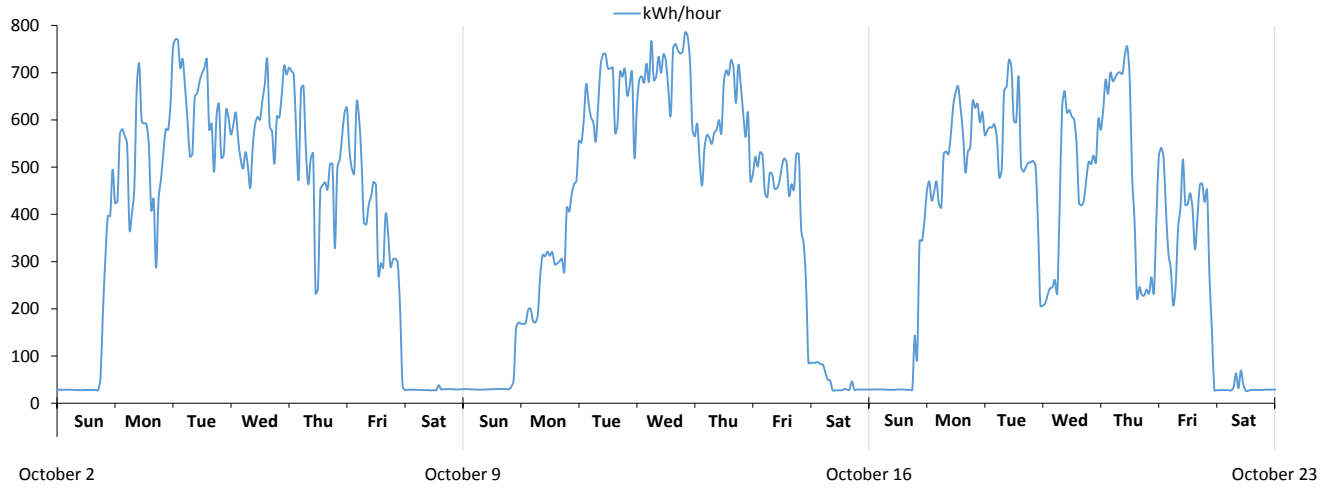
The Energy Pathfinder Research Initiative installed sub-meters at a plastic injection molding plant to monitor the energy consumption of the following systems to better understand the potential for demand shifting:

- Injection molding machines (10 sub-meters)
- Auxiliary loads (3 sub-meters)

Energy Analysis

Exhibit 1 displays the combined consumption of the various sized molding machines, revealing that there are a number of times during the weekly production cycle that the down time of various machines creates low periods of demand for several hours. It is reasonable to expect that, out of the total load of 800 kW, up to 300 kW of demand is available for load shifting. However, the plant will need to modify its control systems in order to execute this load shifting.

Exhibit 1 Total Consumption All Molding Machines (kWh/hour)



Opportunity for Energy Cost Reduction

Load Shifting to Avoid Alignment with IESO Peak Demand

Exhibits 2 and 3 present a closer look at the consumption patterns for two of the larger machines, revealing that both machines are idle for several hours each week.

Exhibit 2 Large Molding Machine #1 (kWh/hour)

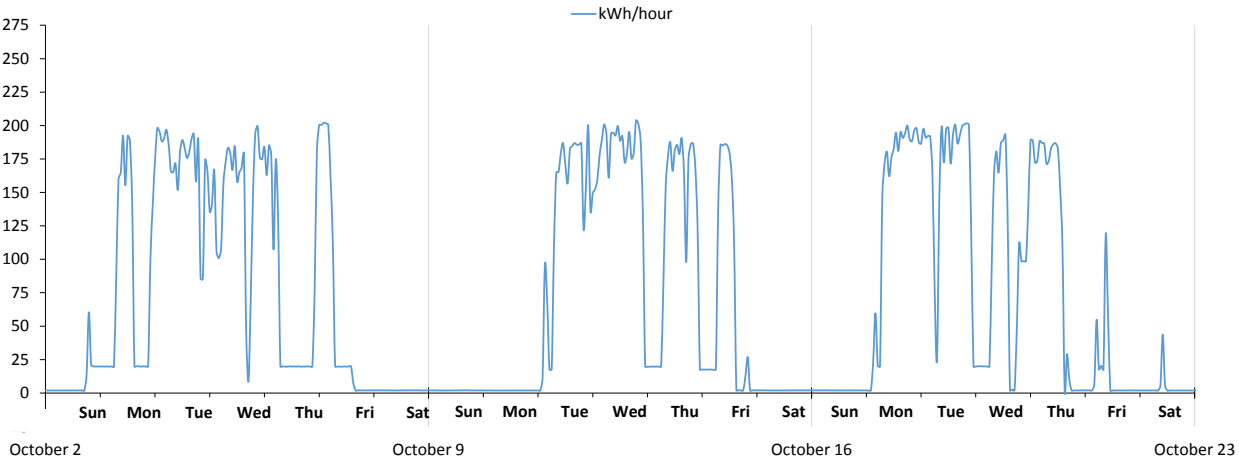
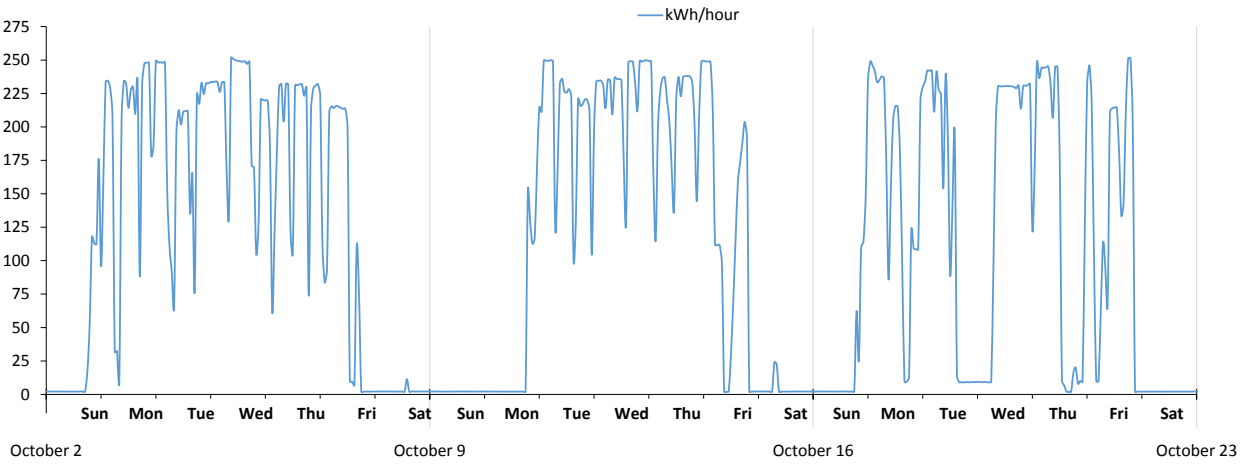


Exhibit 3 Large Molding Machine #2 (kWh/hour)



The cost saving opportunity requires monitoring the IESO's prediction of high peak periods and reacting quickly to lower the plant's demand during those times. In order to maximize the savings potential of this opportunity, the plant must successfully align its low demand periods with the five highest IESO system peaks. The incentive is available through the IESO Industrial Conservation Initiative and is applied by lowering the global adjustment fee that is charged each month. The incentive has many variables that determine its rebate value, but for the sake of this case study can be approximated as $590/kW. For this plant, the incentive would amount to $177,000 for avoiding an estimated 300 kW of peak demand. To accomplish this result, a control mechanism must be developed to react quickly when the high peak demand periods are predicted. The plant will need to install a master controller to coordinate the complete shutdown of a number of preselected machines in order to lower the demand for the period of time indicated by the IESO prediction.

Exhibit 4 Summary of Energy Saving Opportunity

Opportunity	Capital Costs	Demand Savings (kW)	Annual Energy Cost Reduction	Payback Period
Peak Demand Reduction	$50,000	300	$177,000	0.28 years

How many energy efficiency best practices has your facility adopted?
Find out by downloading and completing the CME Pathfinder benchmarking survey (by clicking here). This Excel-based survey covers important best practices associated with process heating, process cooling, machine drives, HVAC systems, lighting, and compressed air. Completing the survey will provide your facility with insights into where it can focus its future efforts to improve energy efficiency.

CME Energy Pathfinder Research Initiative

The Energy Pathfinder Research Initiative is designed to explore, define, and quantify low cost opportunities to improve, control, or optimize specific end uses and energy intensive processes for selected industries within the Ontario industrial and manufacturing sector. The project is unique in that it ***focused on the identification of operational opportunities rather than upgrading inefficient assets*** and aims to identify new best practises for waste energy reduction, realigning energy consumption to correct drivers, and identifying opportunities for load shifting or shedding for lowering peak demand and demand response.

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Canadian Manufacturers & Exporters

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