Research Study Title	Energy Performance of Plastic Injection Molding Processes
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Abstract

This study aims to analyze the energy performance of the plastic injection molding processes of a selected factory, which produce the plastic parts of electric jar pot and electric blender and grinder. The studied process consists of 3 main steps, namely color mixing, injection molding and cooling. The cooling water towers and chillers were used as cooling system for plastic mold cooling. In addition, all defective products and runners are grounded and used as reprocessed materials with maximum allowable limit of 7%. The plastic injection molding machines with clamping force capacity of 160 and 170 tons were used to produce the plastic parts for electric jar pot and four plastic injection molding machines with clamping force capacity of 55, 190, 350 and 420 tons were used to produce for electric blender and grinder.

From the obtained results, the total energy performance index of plastic part production was in the range of 0.0424 – 0.1509 kWh/kg of quality product. About 83.02 – 96.76% of total energy consumption was consumed by plastic injection molding, which depended on the size, weight and configuration of product. The color mixer, cooling tower, chiller, water circulating pumps and plastic grinder machine were consumed only 0.11 – 0.365%, 0.924 – 3.645%, 1.213 – 6.928%, 1.238 – 5.88% and 83.02 – 96.76%, respectively. Based on the operating data, some machines still produced the relatively large number of defective products (approximately 40% of total produced products). Thus, decreasing the defected products by good operating practice will significantly improve the energy performance of this studied

process. In addition, barrel insulation will reduce the electricity consumption of 38,003 kWh/y and the corresponding reduction of CO_2 emission will be 20.59 tons/y. According to the results of feasibility analysis, it could be invested with the simple payback period less than one year and high internal rate of return.

Keywords: CO_2 emission reduction/Energy performance/Plastic injection molding processes