

An Experimental Study on the Effect of Steam Injection Time on Heat Pump Cycle

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Abstract

Clothing management devices are new types of home appliances that use steam and heat pump to refresh (dust removal, deodorize, reduce wrinkles) and sterilize clothing. Steam plays a key role in implementing the performance of the clothing manager. Therefore, steam is essential to be sprayed into the product, and the sprayed steam is dried by a heat pump. The aim of this study is to investigate the effect of steam injection time on the heat pump cycle through experimental. The experiments were performed by variably controlling the steam injection time to 0-8 minutes, and the compress driving, air volume, and superheat were fixed at 55Hz, 1.9CMM, and 5°C, respectively. As a result, when the steam injection time increased by 1 minute, the air temperature at the evaporator inlet and the condenser discharge air temperature increased by 2°C and 3°C on average, respectively, due to the latent heat and sensible heat of the injected steam. As the steam injection time increased from 0 to 8 minutes, the heat transfer amount of the evaporator and condenser increased by 27.5% and 34.7% respectively. In addition, as the steam injection time increased from 0 to 8 minutes, the time required to reach 40°C of the internal case temperature decreased from 1494 seconds to 199 seconds. Energy consumption increased by 88% and COP increased by 33.8% due to the time reduction effect.

Keywords: clothing management devices, COP, energy consumption, heat transfer, latent heat