

Enhancement of the coefficient of performance in air refrigeration system by utilizing free cooling technique

A. Al-Salaymeh

The University of Jordan, Jordan

Free cooling techniques can be used to substantially reduce energy costs. During cold weather, the outside ambient temperature can help in saving energy in refrigeration systems. The low temperature of the cooling ambient air supply enables free cooling technique to store fresh fruits and vegetables which includes some sources for heat generation. This energy-efficiency measure can save enough compressor electric power to pay for modulating damper installation costs in approximately one year. Free cooling has a motorized damper that conducts the two flows of internal and external air. When the damper is opened it takes the air necessary for cooling directly from the exterior, excluding compressor operation. It starts the evaporator fan (active damper) that takes external air if $E^{\text{external}} < I^{\text{internal}}$. However, if $E^{\text{external}} > I^{\text{internal}}$, then the damper remains closed and air is recycled. The compressor is essentially shut off during this period, thereby saving energy and also allowing scheduled preventative maintenance to take place. A case study has been carried out for 17 ton cooling load in a storage room. However there are periods along the year in Jordan where the cooling ambient temperature can be utilized to provide nearly free cooling which can be reached to 83% and the COP can be reached to 24 where the only energy consumption is from the use of evaporative fans.

Biography

A. Al-Salaymeh is Director of Water, Energy and Environment Center at the University of Jordan. He is Professor at the Mechanical Engineering Department, Faculty of Engineering and Technology, University of Jordan, Amman-Jordan. He received Ph.D. degree from the Institute of Fluid Mechanics, Friedrich Alexander Universiti Erlangen-Nurnberg, Erlangen-Germany in April 2001 and M.Sc. and B.Sc. degrees with honor from Mechanical Engineering Department at the University of Jordan. He has special interest in Fluid Mechanics, Turbulence Flow, Two-Phase Flow, MEMS, Micro pumps, Energy, Energy Efficiency, Renewable Energy such as Solar Energy, Wind Energy and Biomass. Also, Prof. Al-Salaymeh has a good research in the area of thermal flow sensors (Patent registered in Germany), Flow-Measurement Techniques such as Hot-Wire Anemometer (HWA) and Laser-Doppler Anemometer (LDA), and Turbulence Phenomena. He has Published many papers in the international Journals and an active in participating in many scientific conferences. Currently, he is an assessor for Jordan Accreditation System (JAS). During the summers of 2002-2012, he was invited by the Institute of Fluid Mechanics, Friedrich Alexander Universiti Erlangen-Nurnberg, Germany, the Institute of Fluid Mechanics, Technische Universiti Hamburg-Harburg, Germany, Institute for Micro technology, Technical University of Braunschweig, Germany, Institute for Aerodynamic und Gas dynamic, University of Stuttgart, Hochschule Ostwestfalen-Lippe / Standort Höxter, where scientific research in fluid mechanics, instrumentation and renewable energy was conducted.

salaymeh@ju.edu.jo