

The Study of Sintered Wick Structure of Heat Pipes with Excellent Heat Transfer Capabilities

Authors : Im-Nam Jang, Yong-Sik Ahn

Abstract : In this study sintered wick was formed in a heat pipe through the process of sintering a mixture of copper powder with particle sizes of 100 μ m and 200 μ m, mixed with a pore-forming agent. The heat pipe's thermal resistance, which affects its heat transfer efficiency, is determined during manufacturing according to powder type, thickness of the sintered wick, and filling rate of the working fluid. Heat transfer efficiency was then tested at various inclination angles (0°, 45°, 90°) to evaluate the performance of heat pipes. Regardless of the filling amount and test angle, the 200 μ m copper powder type exhibited superior heat transfer efficiency compared to the 100 μ m type. After analyzing heat transfer performance at various filling rates between 20% and 50%, it was determined that the heat pipe's optimal heat transfer capability occurred at a working fluid filling rate of 30%. The width of the wick was directly related to the heat transfer performance.

Keywords : heat pipe, heat transfer performance, effective pore size, capillary force, sintered wick

Conference Title : ICFMHTT 2024 : International Conference on Fluid Mechanics, Heat Transfer and Thermodynamics

Conference Location : Istanbul, Türkiye

Conference Dates : July 29-30, 2024