

# Development of Cooling Necklace System Using Vortex Tube



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**Abstract** A vortex tube is an intriguing, simple system capable of producing cold and hot streams at room temperature from a single compressed fluid supply. It is commonly used as a cooling system in many industrial applications because of its remarkable cooling capability and simplicity with no moving parts. This vortex tube does not need any refrigerants or chemical fluids to function as intended as a cooling device. The usage of the vortex tube as a cooling device that has been implemented in a cooling necklace has less to no substantial research data. Therefore, it is hard to determine the best possible outcome that could be achieved by integrating the vortex tube with a cooling necklace. Thus, the main objectives for this research are to determine the performance of vortex tube as a cooling device on a cooling jacket at different cold mass fraction and also to determine the performance of vortex tube as a cooling device on a cooling jacket at different inlet pressure. In this particular research, an experimental study was conducted in two different situational environments, one in a controlled environment which is indoors while the other is outdoors with direct sunlight to simulate real-life situations where the cooling necklace might be used. It can be concluded that cold mass fraction of 0.4 and the highest inlet pressure of 0.4 MPa are the optimum values to obtain the lowest temperature inside of the cooling jacket.

**Keywords** Vortex Tube · Thermal Comfort · Cooling Necklace

## 1 Introduction

The Vortex Tube is a simple mechanical device that separates compressed gas into cold and hot streams. This VT was initially invented by French physicist George J.

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M. Y. Ismail et al. (eds.), *Technological Advancement in Mechanical and Automotive Engineering*, Lecture Notes in Mechanical Engineering,  
[https://doi.org/10.1007/978-981-19-1457-7\\_75](https://doi.org/10.1007/978-981-19-1457-7_75)