

# Development Of Heat Switch For Low-Temperature Application

## Abstract

A heat switch is a useful device in various cryogenic applications, including space technology, as it enables the provision of a conducting or insulating pathway between two regions of interest that possess different temperatures. The heat switch in the cryogenic application is used to minimize heat loads on cooling systems by disconnecting the components while cooling is not required. Heat switches based on various principles have been described in the literature, however, the mechanical and gas gap types are the most frequently utilized in various applications.

This project will focus on designing and developing a compact gas gap heat switch aiming at achieving minimum actuation temperature on a cryogenically cold device. The present objective of the heat switch development project comprises two main aspects: first, to minimize the parasitic heat load emanating from an ideal system and its transmission to the ongoing experiment and second, to reduce the need for additional mechanical and instrumentation activities before each set of experiments through the integration of the heat switch into the experimental setup. For this study, a standard closed-cycle refrigeration system will be used. The heat switch is intended to operate within a temperature range of 10 – 300 K. The thermal characteristic such as conductance in the ON and OFF state will be studied experimentally and analytically.

## Academic Project Requirements:

1) Required No. of student(s) for academic project: 1

2) Name of course with branch/discipline: M.E./M.Tech Mechanical Engineering

3) Academic Project duration:

(a) Total academic project duration: 40 Weeks

(b) Student's presence at IPR for academic project work: 4 Full working Days per week

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