

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

BELGAUM, KARNATAKA



A Project report on

**SMART REGULATOR FOR TEMPERATURE CONTROL
OF OIL IN A HYDRAULIC SYSTEM**

Submitted in partial fulfilment of the requirements for the award of degree

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ABSTRACT

The main objective of this work is to regulate the flow of oil in a hydraulic system and maintaining its temperature within a specific range by employing a shape memory alloy. The project involves design and development of the regulator.

Currently in hydraulic systems, a thermometer is used for periodic checking of oil temperature in the reservoir. One of the functions of a reservoir is to reduce the temperature of oil, whose effectiveness depends on the size. An automatic temperature regulator can help reduce the large size of reservoir and maintain the temperature of oil circulating in the system. Initially, the work involved selection of the appropriate material .After going through the materials which are available in the market, an advanced material, NiTiNol(smart material) was selected.

Nitinol is a shape memory alloy .Shape Memory Alloy is a metallic alloy which has the ability to “remember” a preset shape. It can be easily deformed in its cold state but upon heating regains its original shape. Using this peculiar characteristic of the material the mechanism was developed. The changes observed in properties are inherent to the material and not a result of some electronics therefore no external power source is required for the functioning of the device.

As the size of the reservoir is reduced the system becomes economical and because it is automated there is no need for regular temperature checking.

The basic elements of the device are the Shape memory alloy, A helical tension spring with the appropriate stiffness against the SMA, An Aluminum rod which connects the restoring element and the SMA; A spool is combined with the connecting rod to open and close the hot fluid inlet, separate hot and cold fluid inlets and an outlet.

Apart from this the mechanism can also be used as a Temperature check valve in a system. If the operating temperature exceeds the limit the flow through the valve is restricted.

A three dimensional virtual model of the oil temperature regulator was made by using modelling software. Finally the product was developed/ fabricated and experimented.