

Self Actuated Cooling System

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Abstract— Nowadays to make engines more compact yet powerful lot of technologies are used, and due to other vehicles emissions and increasing heat level in our climate the heat inside the compartment keeps crossing its limits and there is nothing to cool the compartment or at least to keep under control. Electronic temperature actuated thermostats are smaller, lighter, and more efficient than ever. So, hereby we are going to make “Self-Actuated Cooling System” using electronic temperature actuated thermostat in the world of AUTOMOBILE for keeping heavy-duty and high-performance vehicle’s ENGINE COMPARTMENT COOL. Sometimes our vehicle engine bay or compartment during long run or by doing some heavy work becomes too hot, and there is no such technology to keep it cool or at least under control, as we know exceed in engine heating leads to low efficiency and engine performance. So, here our project will do the work. We are going to place some ‘Lightweight Kinematics’ (OPENING FLAPS) near outside part of engine compartment on the body of the vehicle. SO, when the car or our vehicle is at normal run and UNDERHOOD ENGINE temperature is normal the kinematics, the flaps will remain closed for ‘OPTIMAL DESIGN AND FOR KEEPING ENGINE BAY NEAT’. But when the underhood or engine compartment temperature increases, the SPRINGS made up of temperature activated thermostat will reach ACTIVATION TEMPERATURE and they will expand pushing the LIGHTWEIGHT KINEMATIC FLAP will open and through natural air the engine bay or compartment will get cooled. THIS IS HOW PHYSICS HELP TECHNOLOGY.

Keywords: Cooling System

I. OBJECTIVES

- Engine Compartment will be cooled through NATURAL AIR
- Life of Engine elements will be increased.
- To increase the economy
- OBJECTIVES SELF ACTUATED COOLING SYSTEM ARE USED IN VEHICLES FOR BEST AERO EFFICIENCY AND OPTIMAL DESIGN SOLUTION TO MINIMIZE THE WEIGHT
- THEY ARE SMART ACTUATORS WITH NO ELECTRONICS NEED.
- However, the main objectives are –
 - 1) Selection of material on basis of strength.
 - 2) Minimize the weight of the vehicle.
 - 3) Reduce the cost.
 - 4) Efficient cooling over the vehicle.

II. METHODOLOGY

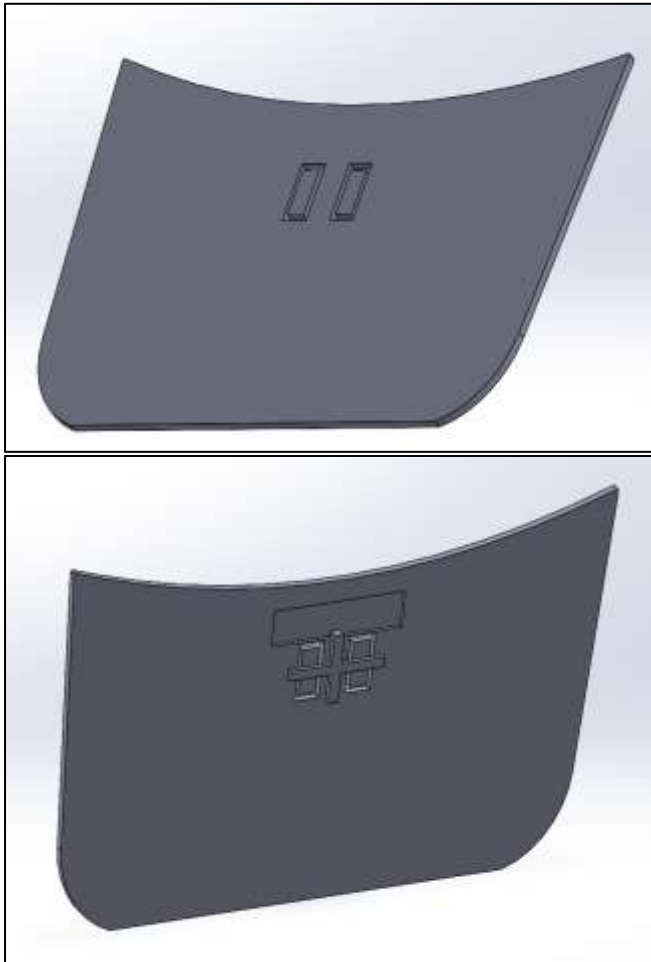
A. Concept and Working

- It is designed to help extract heat generated from the and accumulated under the engine cover. What makes it interesting is that it isn’t operated electronically and is fully self-actuated.
- The system comprises of two small springs
- Made from a shape memory alloy.
- These springs have a thermal memory
- Which means the chemical structure.
- Changes based on the temperature.
- When the springs hit a certain temperate, they push open four small flaps on the engine cover.
- Through which natural air will enter the engine compartment which help the engine compartment to get cooled down.
- In our way of execution in making self-actuated cooling system, We use a temperature activated THERMOSTAT as a mean that will expand and open the light kinematics made of metals.
- Flaps will get closed when the under-hood temperature gets back to normal.

III. DESIGNING

A. Materials

- Memory Alloys, a metal with a thermal memory, which changes its chemical structure and its status according to the temperature. We used it to generate movement – a linear one, not in rotation. It helps save weight because it doesn’t need hydraulic, electric or mechanical actuation.”
- This patented mechanism uses shape memory alloy to activate four flaps, improving the thermal performance of the car when necessary. The word ‘necessary’ is not accidental. It is used because this system is completely autonomous without the use of Electro(ON)ics, and is able to open and close the flaps according to thermal status of under hood and the aerodynamics needs.
- SMAs can work as sensors because their electrical resistance is dependent on their strain (the electric resistance is increased with applied tension strain).
- Shape memory alloys (SMA) are metallic alloys that are able to undergo large reversible deformations under loading/thermal cycles and are able to generate high thermal-mechanical driving forces.
- The behaviour of SMA is due to their native capability to undergo reversible changes of the crystallographic structure, depending on temperature and state of stress.
- These changes can be interpreted as reversible martensitic transformations between a crystallographic more-ordered parent phase



IV. ADVANTAGES

- Eliminate heating problems: - less heat hence more efficiency and power.
- No extra electronics required: - No extra electronic system no extra charges.
- LESS INTERNAL DECAYING OR DAMAGE OF INTERNAL COMPONENTS THAT ARE UNDER THE HOOD IN ENGINE COMPARTMENT.

REFERENCES

- [1] Lamborghini is using this system in its new car SIAN FROM 2020.