Abstract

Off-highway motorcycles do not have a temperature gauge, so we designed a new radiator cap which accommodates a thermometer. We focused on design requirements of simple installation, ergonomics, ease of use, and aesthetics. Our design process included comparison with a benchmark, computer modeling, and prototyping.

Product Design

In the design of the C.T.I. Radiator Cap the following criteria were taken into consideration:

- Ease of installation
- Ease of use
- Perform function of stock radiator cap
- Temperature indicating
- Improved ergonomics and aesthetics

To achieve these requirements the following was done; The radiator cap was chosen as it is simple to remove and replace. It was modeled using SolidWorks as in Figure 1 and then a rapid prototype was obtained using our CAD file. The cap was machined out of a piece of solid aluminum to obtain the improved ergonomics and aesthetics. A thermometer was placed in the cap that extends into the radiator fluid. The pressure and deflection that the cap would be subject to were simulated in Abaqus, proving the feasibility of the design. This work is shown in Figure 6.

Comparison to Benchmark

The C.T.I. Radiator Cap was designed to carry out the same function as the stock cap with the addition of indicating the temperature. The dimensions of the cap were increased to allow the thermometer to fit in the cap. The increased dimensions also allowed for increased surface area to grip the cap for removal and installation. The stock cap uses a conventional coil spring while the C.T.I. cap had to use a disk spring to allow the thermometer to go through the center of the cap and still allow for proper sealing between the cap and radiator. A survey was conducted in the target market that uses the benchmark. A few of the results are shown in Figure 2.

Conclusion

The C.T.I. Radiator Cap allows the user of an off-road motorcycle to monitor the temperature of, and avoid damage to the engine.

Problem Definition

Off-highway motorcycles are subjected to harsh environments along with stressful use which create high temperatures in the engine. If the engine is allowed to reach elevated temperatures it will sustain permanent damage. The C.T.I. Radiator Cap will allow the operator the ability to monitor the temperature of, and avoid damage to the engine.

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References

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