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Design and Thermal Analysis of a Rocker Arm

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Abstract: The aim of the research is to model and analysis the rocker arm with a different material together with the existing material. Rocker arm is used to control the valve opening and closing time of an engine. The existing rocker arm is compared with new proposed rocker arm consisting of different material. The results are plotted and discussed.

Key words: Design, rocker arm, thermal analysis, different material, engine, existing material

INTRODUCTION

The material of existing rocker arm is being replaced with various other materials. The strength of the rocker arm with replaced material is compared with the existing rocker arm (Satapathy *et al*., 2008; Sharief and Sushmitha, 2015; Nagaraja and Babu, 2015; Chan and Pisano, 1987). Rajesh *et al*. (2017) have tried to optimize the leaf spring. In this study, the material of the existing rocker arm is replaced with magnesium alloy. The rocker arm made up of magnesium alloy is designed and analysed in this study.

MATERIALS AND METHODS

The properties of the material chosen are shown in Table 1. The rocker arm is designed with optimum boundry conditions and designed rocker rm is shown in Fig. 1.

Table 1: Material properties

Types	Properties
Volume	3.1252e+005 mm^3
Mass	3.254 kg
Tensile strength	84 N/mm^2
Elongation at break	0.6%
Flexural strength	138 N/mm^2
Compressive strength	210 N/mm^2

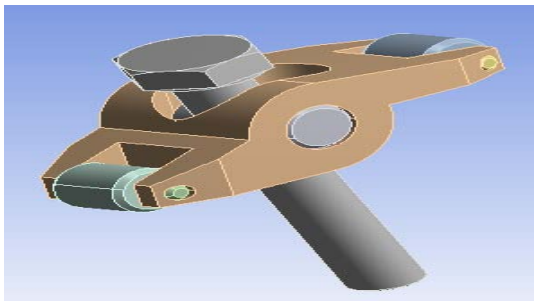

Fig. 1: Designed rocker arm

Analysis of rocker arm: The rocker arm made up of magnesium alloy is subjected to thermal analysis. Stress and strain energy deformation and total deformation is shown in Fig. 2 and 3. The effects of strain energy, normal stress and strain deformation is shown in Fig. 4-6.

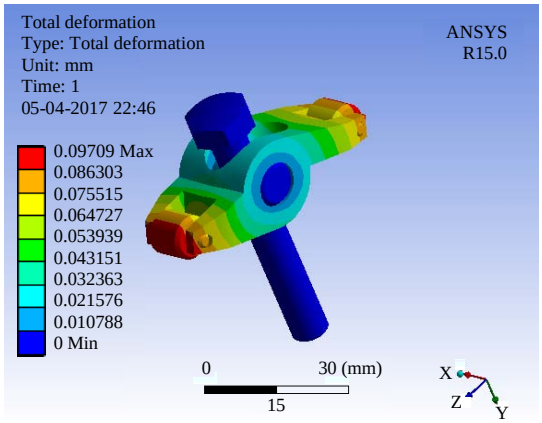

Fig. 2: Stress and strain deformation

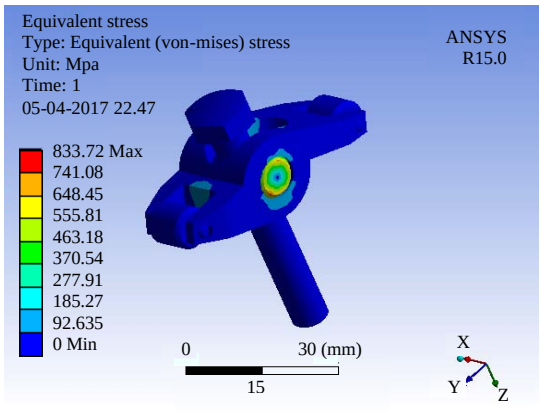

Fig. 3: Total deformation

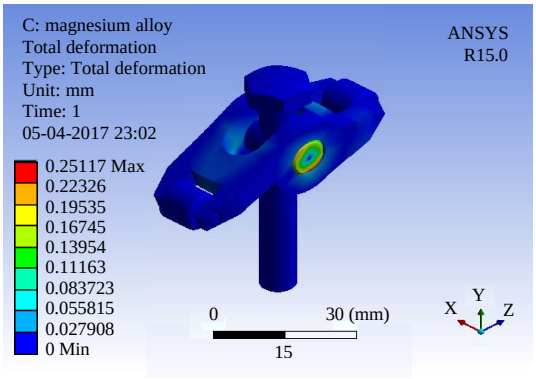

Fig. 4: Effects of strain energy

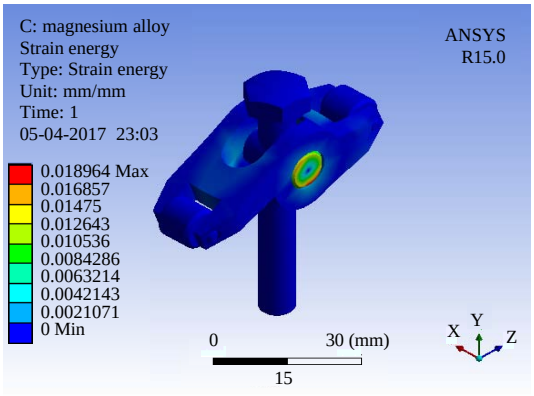

Fig. 5: Effects of normal stress

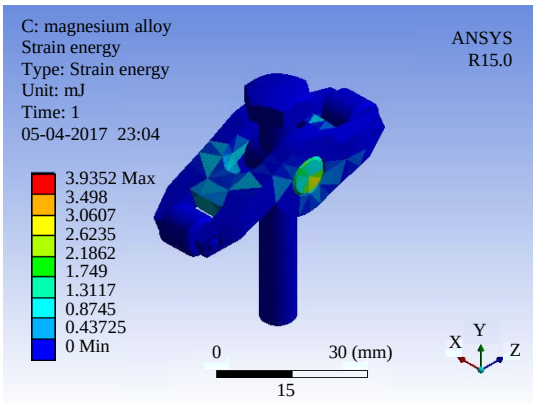

Fig. 6: Effects of strain deformation

Table 2: Results

Types	Min.	Max.
Total deformation	1.254e-2	6.935e-2
Shear elastic strain	-2.14-3 m/m	3.214e-3 m/m
Strain energy	10.169e-2 J	9.215-e2 J
Normal stress	-13.215 Pa	19.124 Pa

RESULTS AND DISCUSSION

The rocker arm made up of magnesium alloy is designed and analysed in this study. The results of the analysis are shown in Table 2.

CONCLUSION

The rocker arm made up of magnesium alloy is designed and analysed in this study. The results show that the new proposed rocker arm could exhibit better properties than the existing one.

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