Journal of Engineering and Applied Sciences 13 (Special Issue 6): 5222-5223, 2018
ISSN: 1816-949X

Analysis of Modified Clutch Plate Design Using ANSYS

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Abstract: Clutch is the major component in the engine which is used to transmit the power from the engine to the wheels. In this study, the single plate clutch is redesigned and analyzed. The modified clutch plate design is designed by the SolidWorks Software. And the analysis did by the ANSYS ADPL Software. After the analysis the results of proposed design is compared with the existing design.

Key words: Clutch, transmission, design, SolidWorks, analysis, ANSYS

INTRODUCTION

Clutch plate is device which is used to transmit the power 3M innovative properties company this study explained by Seitz *et al.* (2003) from the engine flywheel to wheel by engaging and cut the power from the engine Borg-Warner automotive transmission and engine components corporation this study described by Ghidorzi *et al.* (1993) flywheel to wheel by disengaging. Clutch plate is one of the important parts in automobile field. Without clutch we cannot run the vehicle. The clutch is also used for smoothly run the automobiles automotive composites company this study explained by Stefanutti *et al.* (1998) and Willwerth and Guitar (2000). There are many types of clutch plates available, they are single pate (Muruganandam *et al.*, 2015; Jayakumar *et al.*, 2015) clutch, multi plate clutch, cone clutch.

MATERIALS AND METHODS

The two dimensional drawing of the clutch plate is shown in Fig. 1. Front and side view of the clutch plate and the dimensions and angles are clearly showed in Fig. 1.

The steel alloy was commonly used material in the clutch plate. In this study, we will also use the steel alloy for analysis the clutch plate. The steel alloy has more strength and low (Selvakumar and Manoharan, 2014) economic than other clutch plate materials. The clutch plate design was created by the SolidWorks 15. The model was modified in the design from the presently used clutch plate. The modified design is analysis in the ANSYS ADPL Software. The results of the modified clutch plate values are compargked with existing design.

Meshed drawing of clutch plate: The clutch plate 3D Model was created in the Ansys designing step. After the designing it was meshed by the mesh command for converting the clutch plate as more elements and more nodes. The clutch plate meshing image was showed in the Fig. 2.

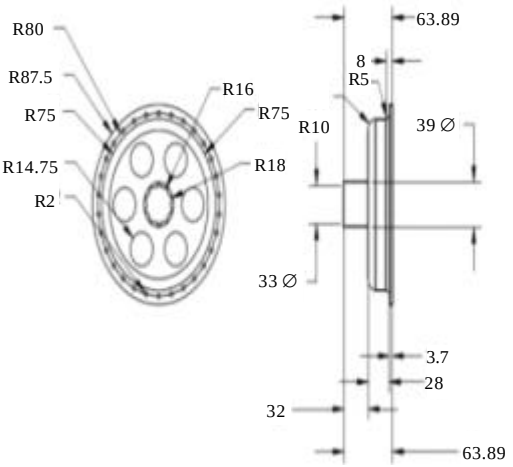

Fig. 1: 2D view of clutch plate

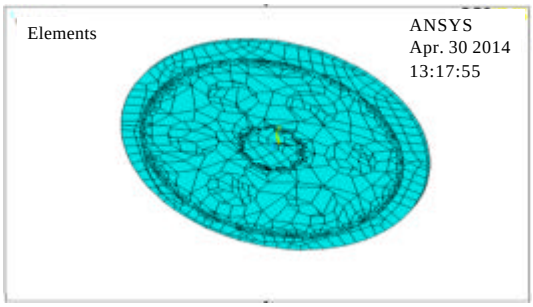

Fig. 2: meshing of clutch plate

Maximum von mises stress: The clutch plate was statically analyzed in the ANSYS ADPL Software. The

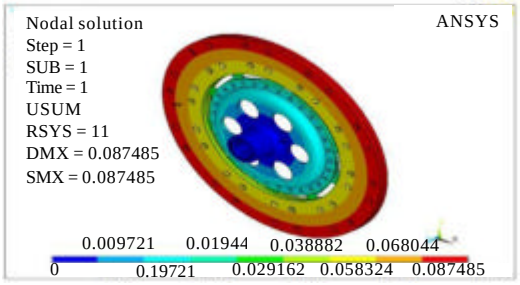

Fig. 3: Maximum Von Mises stress of the clutch plate deformation

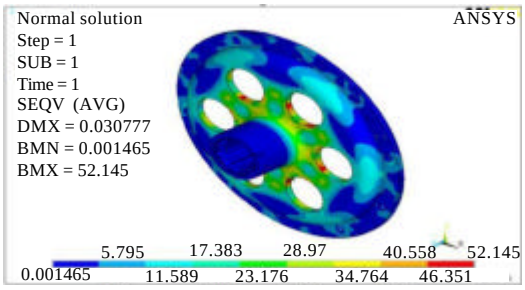

Fig. 4: Deformation of the clutch plate

Table 1: Results

Results	Values
Maximum Von Mises stress	0.0874
Deformation	52.145

maximum von Mises stress of the clutch plate was showed in Fig. 3. The centre part of the clutch plate fully safer one. And the outer circle of the clutch plate was maximum stress area (Table 1).

Deformation: Deformation is the important one in the analysis. The material character is based on the deformation result from the analysis. Figure 4 shows the maximum deformation and minimum deformation of the clutch plate by different colors.

RESULT AND DISCUSSION

Table 1 results of the clutch plate analysis are noted. The maximum Von Mises stress of the clutch plate and deformation of the clutch plate are noted on Table 1. The maximum Von Mises stress of the clutch plate vas 0.0874 N/mm^2. The deformation value of the clutch plate is 52.145 mm.

CONCLUSION

The new modified single plate clutch was successfully designed by using SolidWorks Software. The 3D Model is analyzed in the ANSYS research bench. The created clutch plate was little modified from the present using clutch plate. The new modified design was successfully analyzed in this study and also the new proposed design values are compared with the existing design. Our new proposed design was safe than the existing design. So, the clutch plate was fabricated in the modified design it will obtain more efficiency than the present model.

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