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### INTERNATIONAL JOURNAL OF RECENT TECHNOLOGY SCIENCE & MANAGEMENT

#### “THERMAL TRANSIENT ANALYSIS ON MULTI-PLATE CLUTCH USING WITH DIFFERENT MATERIAL”

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#### ABSTRACT

*This paper uses computational modelling to analyse wet clutch. For multiplate clutches, 2-D drawings are created using computational computations. The bike clutch is modelled in three dimensions using Solid Edge modelling software. The clutch's FEM analysis is performed by adjusting the friction materials, including some composite and non-metal materials. It is determined which substance is most appropriate for lining friction surfaces. To verify the quality, wet grating plates will undergo thermal transient study. Solid Edge software is used to model the multi-plate clutch. The model is then loaded into ANSYS software for structural and thermal analysis, which verifies the temperature contours and quality. The findings demonstrate that friction-causing materials such as aluminium oxide, cast iron, carbon, and alloys 146.31 °C, 136.77 °C, 146.44 °C, 149.99 °C and 144.54 °C respectively.*

**Key Words:** ANSYS Solidwork; Wet-Clutch plat; Temperature.

#### I. INTRODUCTION

Friction clutches and brakes are considered to be the most common type used in automotive application. Two or more surfaces are pressed together by a normal force to create a friction torque. The friction surfaces could be flat and perpendicular to the axis of rotation. Figure 1 shows the main parts of typical single-disc clutch system during engagement and disengagement operations. The requirement for an accurate estimation of the surface temperature of the friction clutch increases for different applications in the mechanical engineering field to avoid the early failure or damage in the contact surfaces. Faïdh-Allah [1] developed a thermolelastic finite element model of the friction clutch (single clutch disc). The effect of different friction materials (material properties) on the thermal and mechanical behavior was investigated intensely. Organic and Sintered friction materials was used as a friction facing of the clutch disc. The results showed the temperature distribution, the heat flux due to friction and the contact distribution on the contact surfaces of the friction clutch at any time during engagement. It was found that the highest temperature and contact pressure occurred when using Organic friction material.

#### II. ENERGY CONSIDERATION

Heat Transfer is a kind of energy transportation, where the heat will be transferred by conduction, convection and radiation. The relative motion that occurred between the clutch parts, due to this fact one can be neglect the effect of radiation [1-4]. The input and output powers to the clutch system are explained in Figure 2. It was clear from mentioned figure that the energy was classified into two categories. The first category was the mechanical energy (Pm.

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input and Pm. output) and the second one was the thermal energy (Pt. output).

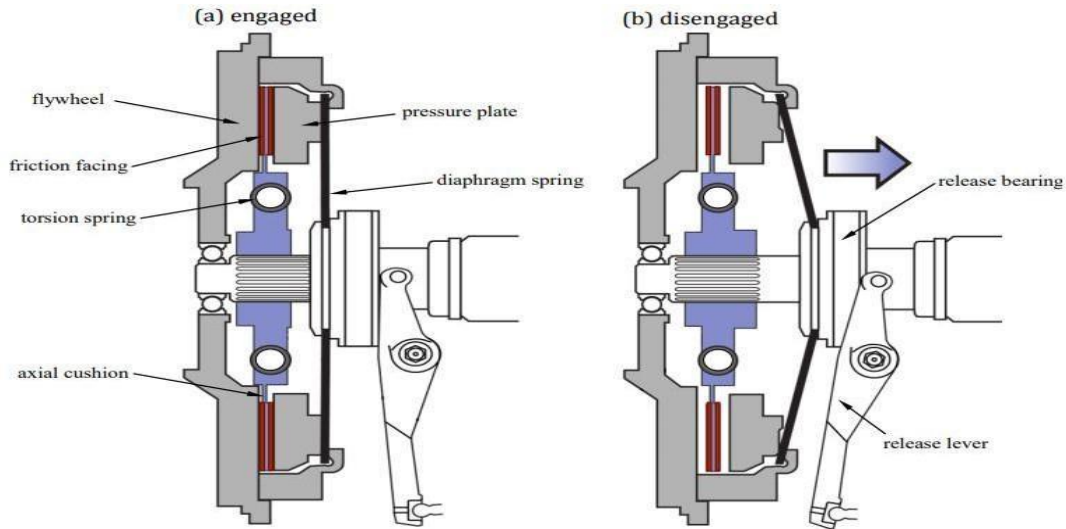


Fig. 1. Major parts of a single-disc clutch system

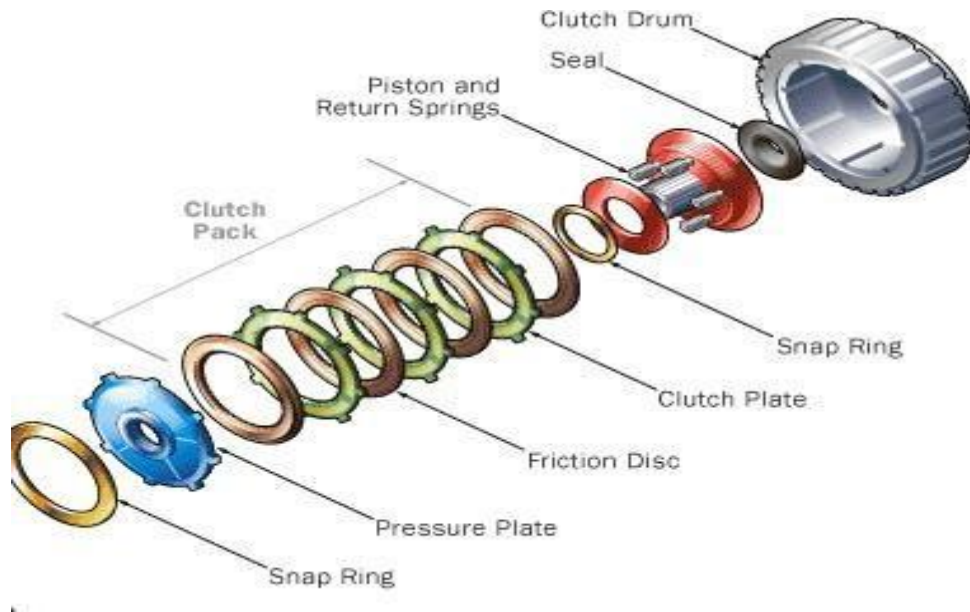


Fig. 2. Input and output powers of the clutch system

### III. METHODOLOGY

ANSYS is very useful in preventing part-time testing (FEA) group programming group. Element Element Analysis is a numerical process for the reconstruction of an informal structure into small amounts (reduced customer size) called components. The object completes the conditions that govern the leadership of these parts and illuminates them all; to make a complete description of how the structure moves in general. These results can then be presented in structured, [http:// www.ijrtsm.com](http://www.ijrtsm.com) © *International Journal of Recent Technology Science & Management*

or graphical formats. This type of test is commonly used in the construction and development of a system that is unnecessarily difficult to disassemble by hand. The systems that may be included in this setting are surprisingly impressive due to their mathematical, scale, or orientation conditions. ANSYS is a standard FEA that displays a gadget within the Department of School Engineering in various schools. ANSYS is also used in Civil and Electrical Engineering, as well as in the field of Physics and Chemistry. ANSYS provides a practical strategy for evaluating the display of objects or techniques in a visual environment. This includes a reduction in the level of risk, and the cost of inadequate programs. The integrated concept of ANSYS additionally provides a way to ensure that customers see the result of planning and all that is expected of an object lead, be it electricity, heating, machinery, etc.

IV. SIMULATION RESULT

4.1 Aluminium Alloy material Clutch plate

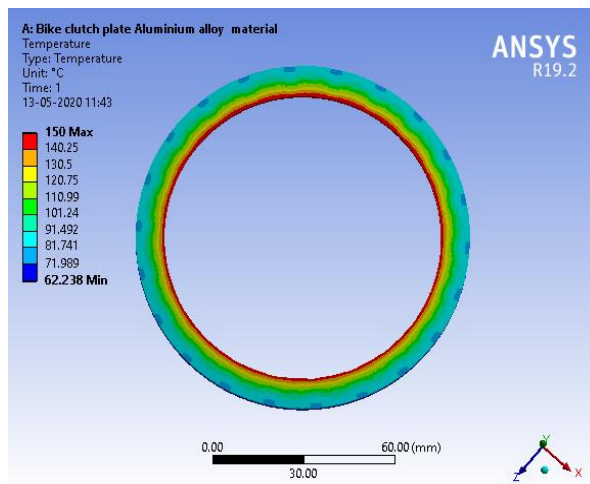


Fig. 3. Al alloy Clutch plate heat flux results.

4.2 Aluminium Oxide clutch plate materials

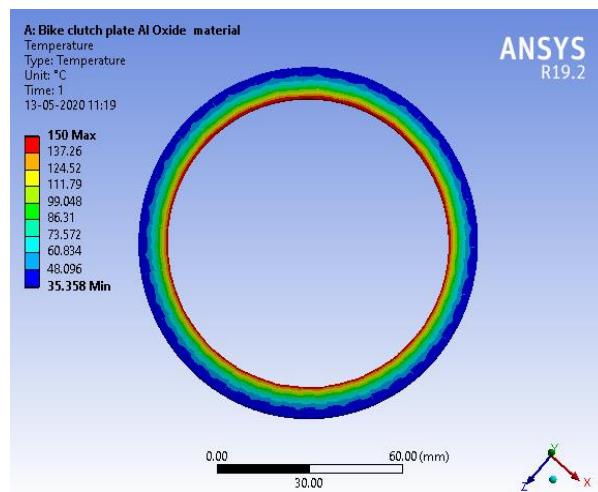


Fig.4 . Al Oxide clutch plate temperature results.

4.3 Cast iron clutch plate materials

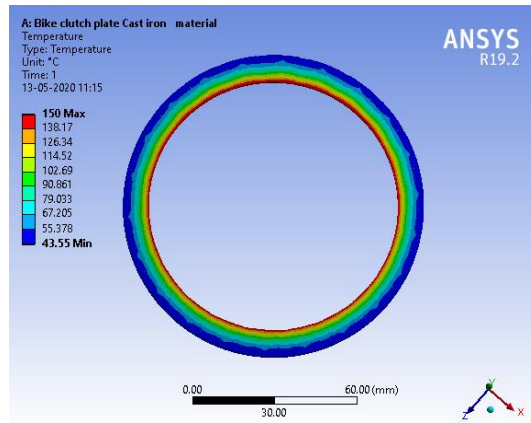


Fig..5 Cast iron Clutch plate heat flux results.

4.4 Al nitride clutch plate materials

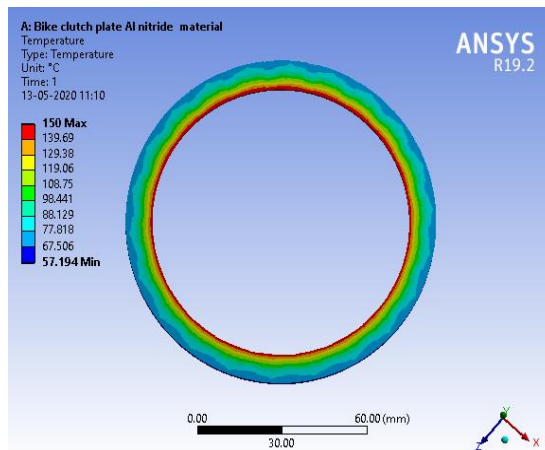


Fig.6. Al nitride clutch plate temperature results.

4.5 Kevlar clutch plate materials

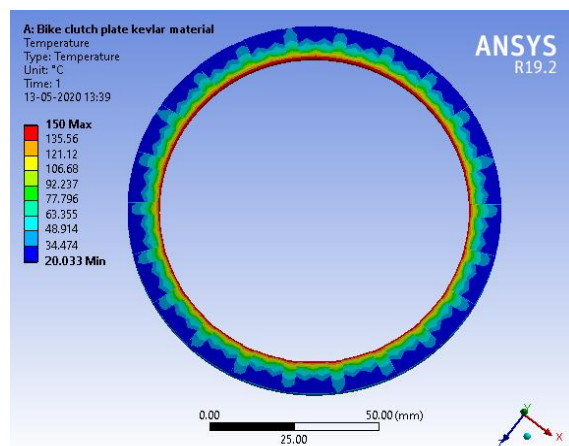


Fig.7 . Kevlar material clutch plate temperature results

4.6 Carbon fiber clutch plate materials

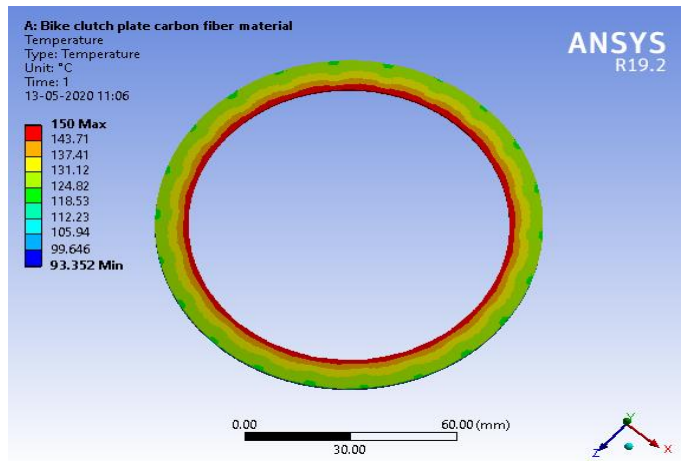


Fig.8. Carbon fiber Clutch plate heat flux results.

Here find out results are temperature and heat flux. Five different likes Al alloy, Al oxide, Cast iron, Ceramic and Al nitride multi plates materials used and used ANSYS software based transient thermal analysis has performed. find out results temperature and heat flux.

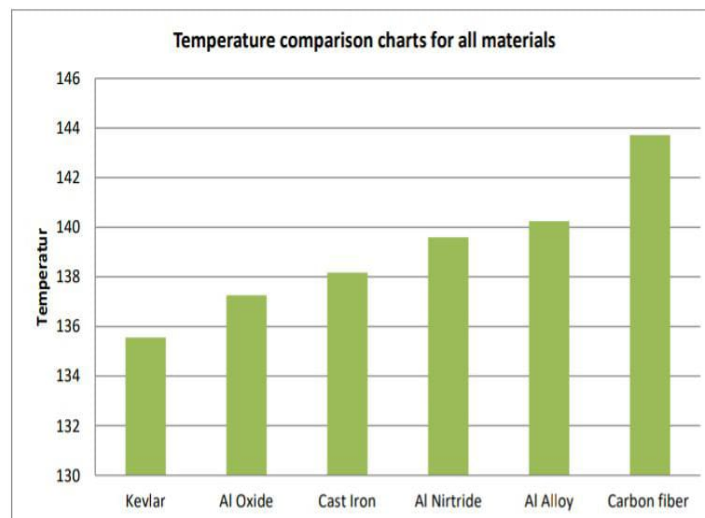


Fig.9 Temperature comparison charts for all materials

V. CONCLUSION

Thermal transient investigation will be done on the wet grating plates to check the quality. Modeling of Multi plate clutch is done by using Solid edge Software and then the model is imported into ANSYS Software for Structural, Thermal analysis on the Multi plates to check the quality and temperature circulation of distinctive friction materials such . find out temperature results with all five materials are respectively likes Al alloy, Al oxide, Cast iron, Al nitride ,kevlar composite and carbon fiber material are respectively 140.25°C, 137.26°C, 138.17°C, 139.6°C and 135.56°C and 143.71°C .

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