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AN ANALYSIS FOR IMPROVING PERFORMANCE OF TRAIN BRAKE PAD BY USING CAD AND CAE SOFTWRE

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Abstract: *A running train contains energy, known as kinetic energy. The simplest ways of energy dissipation is converts the kinetic energy into heat. This conversion will do by applying a contact material to the rotating wheels. This material creates friction and it converts into heat. The wheels slow down and eventually the train stops. The material used for braking is generally in the form of a pad. . The currently air brake system of Railway coach has the drawbacks due to excessive brake force on the brake pad, thermal cracks at brake pad and reduced life of brake block. The aim at this project is to minimize the thermal stress and recesses the crake's formation.*

KEYWORDS :- Train Brake Pad, Non Asbestos Material, ceramic material brake pad, Composite Material, FEM Analysis,CAD software.

1. INTRODUCTION

A brake is a mechanical device which is used for slowing or stoping a moving object or preventing its motion. generally brakes use friction between two surface pressed together to convart the kinetic energy of the running object into heat, though other method of energy conversoin may be apply.

1.1. AIR BRAKE SYSTEM:

In railway, air braking systems is used to force the brake pad on wheels. These systems are known as "air brakes" or "pneumatic brakes".

At early period the cast iron brake shoes was used in Indian Railways after that Asbestos brake shoe was used because of some excessive frictional problem. But Asbestos material brake has created very harmful health problems,due to this some replacement was necessary in brake shoe and therefore NAO material brake shoe is recently used in Indian Railways.

1.2. NON ASBESTOS BRAKE SHOE :-

It is typically used in high performance car and trains also.It conten typically non ferrous metals inorganic and organic fibers,abbrasive,lubricants and property modifiers such as glass,rubbers, kevlars.

1.3. CERAMIC BRAKE SHOE:-

Ceramic brake pads have gained in popularity over the past several years,however they have been used since the mid 1991

2. LITERATURE SURVEY

I. Dr. D.S. Deshmukh & Jha Shankar Madanmohan [1], "Design Evaluation and Material Optimization of a Train Brake " stated that, A moving train contains energy, known as kinetic energy .The extensive majority of the world's trains are equipped with braking systems which use compressed air as the force to push blocks on to wheels or pads on to discs.

II. Vempada Vasudeva Rao & P. Jagan Mohan Rao [2] "Design, Static Analysis and Comparison of Materials on Train Brake Pad" Stated that ,Train is one of the major transportation which makes the things easier at low cost. This train run by diesel and the consumption of the diesel is depends up on the performance of engine and braking system, as the kinetic energy of the train is to be reduced by breaking and electric system. The kinetic energy is to converted into heat by contact of brake pad to the rotating wheels.

III. Ramana Chary & MD Ezaz Kha [3] "Design and analysis of train brake system" Stated that ,A moving train contains energy, known as kinetic energy, which needs to be dissipated from the wheel and pad in order to cause it to stop the wheel. The simplest way of doing this is to convert the energy into heat. The conversion is usually

done by applying a contact material to the rotating wheels or to discs attached to the axles this material creates friction and it converts into heat. The wheels slow down and eventually the train stops.

3. PROBLEM IDENTIFICATION

A moving train contain very huge of kinetic energy. This energy dissipated on surrounding in the form of heat. Friction is created heat, if the brake gets too hot they will cease to work because they cannot dissipate enough heat. Train brake is exposing to large thermal traces during routing braking and extraordinary thermal traces during hard braking. The major drawback in exciting train brake shoes pad is due to high thermal stresses, crake create on the surface of brake pad. The aim at this project is to modified the current brake pad and to improving design. Modification is done by covering the frictional surface of brake pad by ceramic layer.

4. OBJECTIVE

- The aim of project is to give the better solution on the problem of crack formation on the brake pad surface due to excessive heat and thermal stress.
- The current using brake shoe made up by NAO material which has low thermal stability as compare to ceramic material. The main objective of project is to overcome the thermal stresses and improve a life of brake pad with the help of ceramic material.
- Heat dissipation also must increase so material does not affect very much. So all environmental issue may be resolved is also main perspective

5. METHODOLOGY

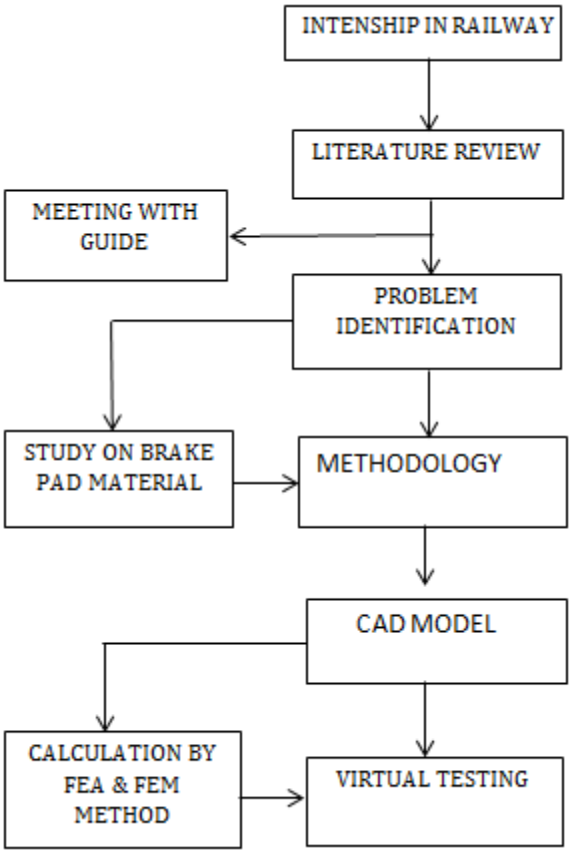

Figure: Methodology chart

6. CONCLUSION

To analyze the non-asbestos (NAO) brake shoe pad use of Indian railway has some drawbacks like low thermal stability due to this thermal stresses come on the brake pads and therefore cracks is form on the surface of brake pad. To modified the non-asbestos brake pad with the help of ceramic coating on the frictional surface and to improve the design of brake pad and reduce the thermal stress and to avoid the thermal crake formation on the surface of brake pad.

7. REFERENCE

[1]Dr. D.S. Deshmukh & Jha Shankar Madanmohan "Design Evaluation and Material Optimization of a Train Brake" in International Journal of Research Studies in Science, Engineering and Technology [IJRSSET] Volume 1, Issue 2, May 2014.

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