



FATIGUE LIFE CYCLE ANALYSIS ON STEERING KNUCKLE BALL JOINT



A MINI PROJECT

Submitted by

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In partial fulfillment for the award of the degree

of

BACHELOR OF ENGINEERING

in

MECHANICAL ENGINEERING

CHRIST THE KING ENGINEERING COLLEGE

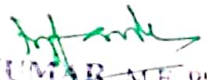
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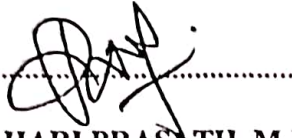
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BONAFIDE CERTIFICATE

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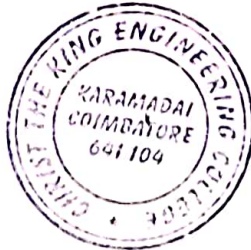
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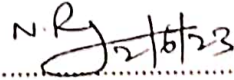
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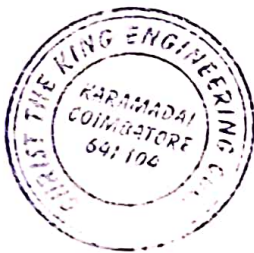



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ABSTRACT

Automobile field is developing vigorously and their sub-industries also. Life of critical component is concern of nowadays. Suspension, steering and braking systems have more critical components. Knuckle ball joint is one of the critical components in steering and suspension systems. The Ball joint has three rotational DOFS. This joint is used to connect the knuckle to the steering rod and the short and long arm. Ball joints allow movement of steering components and suspension Ball joints are a critical component to a car.

They are the part of the vehicle's chassis that connect the steering knuckles to the control arms next to the wheels. The purpose of the project is to modify the design of a steering knuckle to increase its life cycle. Existing component is tested for its fatigue strength experimentally. FEA software is used to reduce the cost of experiment. For better result from FEA, experimental validation will be done.




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CHAPTER-5 RESULTS AND DISCUSSION

5.1 GENERAL

The experimental and analytical results are discussed in this chapter. The experimental values are verified by software results. Comparative studies of experimental and analytical data are also presented.

5.2 FATIGUE LIFE PREDICTIONS AND COMPARISONS WITH EXPERIMENTAL RESULTS

In general, four fatigue life prediction models are commonly used. These include the stress-life model, the strain-life model. The first two models consider the macro-crack nucleation phase as failure.

The stress-based approach is typically used in terms of nominal stresses. Therefore, it does not directly account for the plastic strain at the un-notched, which can have significant effect on fatigue behavior of components under cyclic plasticity conditions. The predictions of this approach for un-notched members of the forged steel steering knuckle ball joint are usually conservative. Local values of stress could also be used in stress-life predictions (here called local stress-life or σ -N method).

The loading conditions, area at fracture, cycles to failure and failure locations for all the tested ball joints. The fatigue life of the ball joints was defined as the number of cycles endured until it completely separated into two pieces. The forged steel joints mainly failed in the transition to the neck region.

In the following sections the life prediction paths pursued are implemented and discussed. The details of fatigue life calculations for each method at the highest moment level for the forged steel steering knuckles ball joint are provided. The table 5.1 shows that the comparison between the experimental and software results.

