

# 2003 Kia Sorento Serpentine Belt Replacement

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SystemsAnalysis of Tensioner Induced Coupling in Serpentine Belt Drive SystemsDynamic  
Analysis of Viscoelastic Serpentine Belt Drive Systems [microform]Development of a New  
Model for the Prediction of Automotive Serpentine Belt LifeAutomotive V-Belt Drives  
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serpentine belt drive systems are widely used in automobiles due to their compactness and long life these systems are composed of a belt a driving pulley driven pulleys and a spring loaded tensioner the driven pulleys may include such accessories as the alternator air conditioner or power steering pump serpentine belt drives experience many different types of steady state motions and transient vibrations due to the different parameters in the system as a result of this it is important to create a mathematical model that allows the designer to extract information about the system such as the natural frequency and the mode shapes the accuracy of the model will depend primarily on the assumptions used in particular a key assumption is whether transverse and rotational motions of the belt are coupled due to the motion of the automatic belt tensioner this coupling is often neglected by authors who model only longitudinal belt response and in effect decouple the transverse and rotational motions using a solution based upon coupled motion as well as a solution employing rotational motion only the importance of this coupling will be assessed both solution results will be compared against published experimental data in addition a parametric study will be performed to determine the ability of the coupled and decoupled models to accurately predict changes in system natural frequencies and mode shapes due to changes in system parameters abstract

automotive front end accessory belt drive systems employ multi ribbed serpentine belt and are subjected to crankshaft torque fluctuation component loading and dynamic

environments which will affect the fatigue life of the belt the onset of catastrophic belt failure occurs in accessory drive systems when the rubber cracks or internal cords loose their resilience and become brittle this limits the durability performance of automotive front end accessory belt drives a new fatigue life model for predicting accessory belt lives subjected to various loading is developed in this study the stress life approach is employed to create the belt life equation where serpentine belt rib stresses are used as the damage parameter the multi axial state of stress in the belt rib tip is related to an equivalent uniaxial stress by employing the sines method and the total mean stresses are derived using the individual mean and the fluctuating stresses as in sines method to simulate the stress state between the v ribbed belt pulley two dimensional and three dimensional finite element models were built in order to study the stress distribution in the ribs of the belt the results obtained from the finite element fe belt model correlates well with the measured strain results which therefore validates the fe belt model and the stresses due to belt pre tension power transmission bending and radial compression are computed using the correlated finite element model the fatigue index b and the fatigue strength coefficient 6f are estimated empirically for the serpentine belt via experimental results the validity of belt fatigue model is confirmed via additional experimental results obtained from a variety of different accessory drive configuration using different loading profiles finally actual vehicle measured data is used to predict the belt life using this belt fatigue model dynamic analysis of a serpentine belt drive system with friction type automatic tensioner is performed and a closed form analytical solution is found for the first time for the sinusoidal input a sampling technique is employed to obtain discrete simulated load distribution for the components and the belt life distribution is predicted using this method

the following information is intended as a guide to be used for evaluating belt construction source approval and quality audit this recommendation has been prepared from existing literature including standards specifications and data supplied by both producers and users these recommendations cover drive layout details and v belt testing methods including test layout pulley diameters torque loads and guidance for interpreting test data the application of these automotive v belts is to power engine or vehicle accessories that are physically attached to the engine although antiquated in design compared to today s serpentine belt drives v belts are still common in many emerging markets the scope is to stabilize the v belt drives

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