

Dynamic Contact & Fatigue Analysis of a CV Boot (Gaiter) Design

M. Yeoman¹, R. Damodharan¹

¹Continuum Blue Ltd, Ystrad Mynach, UK

Abstract

CV boots or gaiters are rubber like material used to cover & protect moveable or articulating components such as CV joints of a vehicle. These are primarily used to protect the articulating joint, by preventing the components from being exposed to the surrounding environment, the preventing the ingress of water, particulate or road grime from mixing with the lubricated articulated components. In addition to this, these covers help retain the lubricating oil or grease in the joint.

However, long term exposure of the CV boot to dynamic motion & high contact stresses, as well as thermal cycling can dramatically reduce the expected life of these protective covers. With this in mind, design engineers need to ensure a CV boot design, ideally eliminates any contact between the CV boot, the articulating components as well as itself. In this work, we present the dynamic analysis of an articulating joint with a CV boot, where the contact behaviour and fatigue life of a CV boot under operational conditions is assessed & where by making simple geometric changes in the design of the CV boot these contact regions in the articulating joints range of motion can be eliminated. Thus highlighting how the study of contact stresses and fatigue life under operating conditions can help to improve and optimise product design and life expectancies in use.

Figures used in the abstract

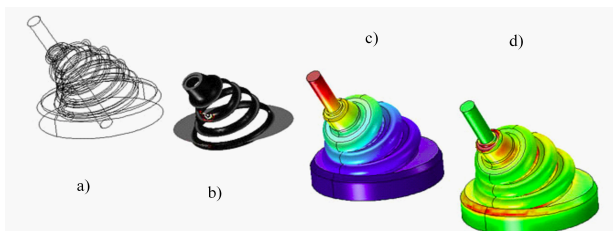


Figure 1: CV Boot Model illustrating a) internal shaft displacement & point of contact, b) Contact Stresses c) Displacements & d) 1st Principal Stress of boot section.

