

# FEA for CV Boots

Optimising CV boots for high performance applications

**MARTIN'S**  
**RUBBER COMPANY**

Since 1865

CV boots for use in high performance applications such as Formula 1, LMP1 and NASCAR are designed specifically for the extreme demands placed upon them. Design considerations can include the level of grease load within the joint as well as the temperatures under which they operate. Both the material specification and the geometry contribute to the performance of CV boots, and it is important that these two factors are considered in parallel.

## Finite Element Analysis for CV boots

FEA simulation must be based upon the actual rubber material grade from which the CV boot is manufactured. This ensures a higher level of accuracy in both the assessment of the performance of the boot and also in any design recommendations. Many FEA services work only with nominal figures for rubber, but this risks inaccuracies which can lead to failure; always check with your FEA provider where the data is taken from.

Rubber generally exhibits a lower tensile strength at elevated temperatures than that shown on a standard data sheet. Our assessment includes an analysis of the effects of thermal heat transfer from the grease in the joint across the internal section of the boot, and this, in turn, allows us to evaluate how the material strength will be affected whilst the CV boot is in operation.

Additional support includes:

- Evaluation of the full assembly
- Stress and strain evaluation
- Recommendations for enhancing product life
- Determining the bead retention under internal pressure
- Identification of likely failure points
- Establishing suitability for high or low cycle life
- Accounting for friction to the housing or shaft
- Exporting of deformed geometry at any position.

## When to undertake FEA for CV boots

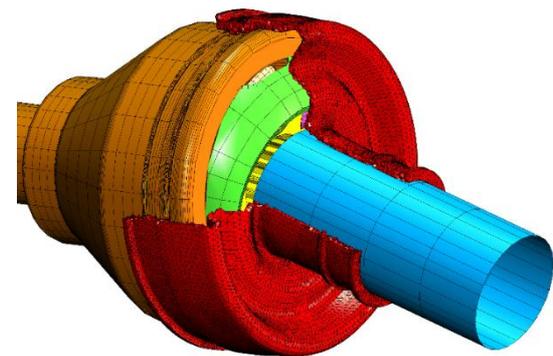
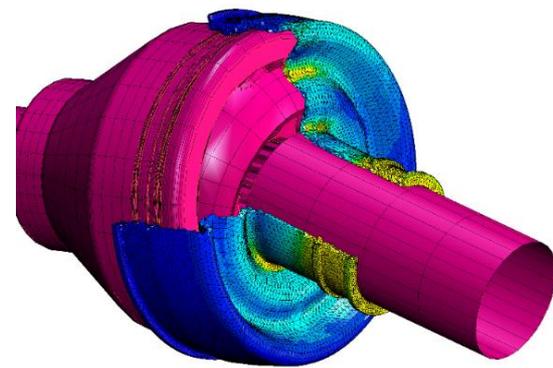
We can assist with performance improvement at any point in the design cycle, including:

- ✓ Prior to product development, assisting with material selection and design decisions based on your specific application's variables.
- ✓ Assessment of a product design prior to manufacture to analyse likely performance and optimise the design before committing to tooling costs.
- ✓ Analysis of a failed product or a part which is not performing to specification to assist in design improvement.

We fully evaluate both the component and the assembly using non-linear FEA, replicating the operating environment of the boot to include thermal effects, the pressure increase from expansion of the grease, the component's tolerances and any misalignment. Our job is to ensure that your product meets the specification you and your customers require.

## Why Martin's Rubber?

With decades of experience in CV boot manufacture combined with state-of-the-art technology for finite element analysis and industry-leading experts in-house, we are perfectly positioned to help you to optimise your CV boot. As well as the support outlined above we can also help you to reduce the size of your current part and optimise its life expectancy by removing the high levels of stress and self-contact often endured during operation.



**EXPERTS IN RUBBER ENGINEERING**

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