

Protective Coating Method for Guitar Whammy Bar Springs

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In this project, research was performed to find protective coatings that could be applied to guitar whammy bar springs. The springs are made of spring steel which oxidizes rapidly causing the structural integrity to fail after a given amount of time. The proper coating could prevent this, protect from moisture, and therefore prolong its usage.

The first option considered was galvanizing the steel with electroplating. For this to be done, there were two main processes: hot dip and cold dip electroplating. At first these options seemed ideal but upon further research, they both presented significant issues. The issue with the hot dip process is that the heat treatment would cause the steel to lose its mechanical properties (which are integral to the purpose of the spring). The cold dip process seemed to be the way to go; however, the zinc in the electroplating reaction causes hydrogen atoms to get trapped in the metal. This is a phenomenon known as hydrogen embrittlement. As a result of this phenomenon, the metal would weaken and lose its mechanical properties. A new option had to be found.

The next option explored was coating the springs with a protective paint. In order for this to be successful, the paint would have to be zinc free (to prevent hydrogen embrittlement) and not require steel preparation by sandblasting (since we do not have access to do that). With these restrictions in mind, a few options for zinc-free paints were found. The three options presented were Rustoelum Combicolor Non-zinc, Corroguard Primer, and Epilux 800. Unfortunately, none of these options are located in the United States so they will have to be sourced internationally.

Once the coating is acquired, some other resources are needed to carry out the process. These supplies range from safe cleaners (such as an alkaline cleaner to avoid damaging the steel) to a stainless steel pot (for heating during the drying process).

Please find a list of necessary materials and research notes in this folder.