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INTEGRATION OF A PHENOMENOLOGICAL ELASTIC-PLASTIC MODEL WITHIN A COMMERCIAL FEA PACKAGE

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Nowadays the concern about greenhouse gas emissions is increasing each day. This concern is not new, the reduction of Co2 emissions in the transportation sector is one example of that. The Co2 emission is intrinsically related with the vehicles mass, therefore reducing their weight will have a positive impact on the Co2 emission reduction.

For instance, in the ground transportation industry and aerospace industry has been adopted the replacement of steels by composites or magnesium alloys.

However, composites and magnesium alloys have some shortcomings that have delayed the reliability previously achieved with steels and aluminium alloys.

One reason to this fact is the lack of knowledge in the mechanical behaviour of light alloys. For example, the magnesium alloys elastic-plastic cyclic behaviour is quite different from the one found in steels, also it cannot be found in a commercial FEA package any elastic-plastic model that modulate such kind of cyclic behaviour. This fact is a shortcoming in design stages of structures made of magnesium alloys; therefore having a way to account elastic-plastic cyclic behaviour of magnesium alloys would be an asset.

In this paper is used a phenomenological elastic-plastic model of a magnesium alloy, the AZ31b-F. This model was set under biaxial loading conditions in laboratory tests where it was mapped different elastic-plastic responses under several loading conditions. The present authors want to go further here by making a linkage between the phenomenological model and a commercial FEA package in order to update the material properties in a dynamic way. Therefore, instead of using an elastic-plastic model contained in the FEA package, will be used the developed model. Results show a good correlation between the estimated results (FEA plus developed model) and the lab results of a magnesium alloy component.