

OPTIMISATION OF MIXING METHODS FOR RADIAL TRUCK TYRE SIDEWALLS ON THE BASIS OF PROCESSABILITY

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Choice of elastomer for the sidewall compound is of great importance in determining the optimum balance of properties required to give adequate resistance to all forms of cracking, especially in radial ply tyres. Natural rubber alone may not fulfill all the requirements and hence the use of blends of natural rubber with other elastomers such as polybutadiene rubber (BR), styrene-butadiene rubber (SBR), etc. has become common. The present study is an attempt to evolve a suitable mixing procedure giving improved processability of the mix. Seven different methods of mixing have been tried, keeping the ratio of natural rubber and butadiene rubber constant. Parameters such as viscosity, die swell and stress relaxation were used to assess processability. BR masterbatch (Mix E) method was found to be the best.

Key words : Natural rubber, Butadiene rubber, Moving die rheometer, Processability tester, Green strength.

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INTRODUCTION

General requirements of a mix for radial tyre sidewall are easy processability, good mechanical properties and good hysteresis characteristics. Only very limited studies have been published on the influence of mixing techniques on subsequent processability of the mix. Hess, *et al.* (1967, 1985) studied the distribution of a single grade of carbon black (ISAF, 60 phr) in a truck tyre tread formulation based on a 50/50 blend of natural rubber and BR. The present study is an attempt to evolve a suitable mixing technique to give improved processability of the mix.

EXPERIMENTAL

Mixing methods

Seven different mixing methods were studied. The formulation and methods of preparation of the masterbatch are shown in Table 1. A brief account of these methods for masterbatch preparation is given below.

Method A (BR phase having no ingredients, A-0)

This is a two step process in which NR masterbatch was made first, with all the ingredients and as a second step BR was incorporated into it.