

**EFFECT OF MIXING PARAMETERS ON PROCESSABILITY AND
PROPERTIES OF FIBER CONTAINED SOLID TIRE HEEL
COMPOUND**

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by

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ABSTRACT

Solid tires specially used in low-speed, high load industrial trucks which consists of three distinct parts: heel, cushion and thread. Among those, the heel is a critical layer of the tire and is designed to offer good resistance to air permeation while ensuring excellent adhesion to the body plies.

There are many factors effecting the properties and processability of tire heel. In this research, mixing parameters which affect the properties and processability of fiber contained tire heel compound was focused to find out the effects of mixing parameters on properties and processability of the compound and to identify the optimum mixing parameters to reduce the rejection level of compound due to cracking.

Cycle time (35s,40s,45s), dumping temperature (135°C,140°C,145°C), rotor speed of mixer (35rpm,40rpm) and feeding sequence (6s,7s,9s) on the properties and processability of the said compound were tested. Furthermore, the physical properties, curing properties and viscosity properties of the compound were analyzed using Tukey method of Minitab-16 statistical software, and the processability issue (crack on mill of tire heel) was monitored.

It was found that there is an effect of the dumping temperature and cycle time on the properties and processability of this tire heel compound. The best results were shown by the batches processed under cycle time of 35s with zero mastication time. Mixing cycle has three main time segments: mastication time, chemical incorporation time and dispersion time. When compound is allowed for mastication, firstly rubber gets mixed alone without any chemicals and it leads to rise temperature of the compound up to 90°C to 140°C, suddenly. Such high temperature reduces the mechanical breakdown of rubber and it converts rubber to thermoplastic nature by not allowing the curing agents to incorporate with additives. By eliminating the mastication time cracking issue could be overcome by enhancing a good dispersion of the compound which yields the best property parameters.

Key words: Cycle time, Mastication, Processability, Properties (curing, physical, viscosity), Solid tire heel compound