

## **Determination of Factors Affecting to the Tensile Strength of Tread Compound of Pneumatic Rubber Tyre Used in Industrial Application**

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There are many factors which affect the tensile strength of pneumatic tyre tread compound. In this experiment, it is focused on mixing process parameters which affect to the tensile strength. The mixing parameters were investigated on an intermesh mixer for selected tyre tread compound. It was identified that the dumping temperature, mastication time, carbon black and silica incorporation temperature and carbon black silica feeding sequence influence the tensile strength of particular compound. The study was conducted to find out the effect of above factors to the tensile strength of tread compound and to identify their appropriate value. For that 1<sup>st</sup> stage mixing was done under three different dumping temperatures (155 °C, 160 °C, 165 °C) and three different mastication times (0 s, 20 s, 40 s) using the best combination of mastication time and dumping temperature changed carbon black silica incorporation temperature (120 °C, 140 °C) and carbon silica feeding sequence. According to the two factor factorial analysis dumping temperature significantly affect to the tensile strength. Experimental results showed that higher and lower dumping temperatures retard the strength but moderate temperature of 160 °C is the optimum. Mastication time also affect to the tensile strength but not significantly. Considering the interaction between mastication time and dumping temperature, we can conclude that it significantly affects to the tensile strength. Best combination of those factors is 40 s and 160 °C. Carbon black and silica dispersion also influence to the tensile strength of tread compound. A minimum temperature of 140 °C is necessary to gain efficient reaction between silica and silane. Feeding silica and carbon black separately avoids the restriction of carbon black against silica - silane reaction.

**Keywords:** Tread compound, Tensile strength, Dumping temperature, Mastication time, Carbon black