Abstract

A tire cord fabric is one of the essential parts of tires. Its main objectives are to reinforce the strength, to carry a load and to impart a dimensional stability to tires. The adhesion between synthetic polymer fibers of tire cord fabric and rubber does depend on a chemical reaction of adhesive chemicals coated on surface of the synthetic polymer fibers. The primary function of adhesive chemicals is to generate the molecular bonding between a fiber surface and a rubber which is the most important characteristic affecting to automobile tire strength.

The adhesion strength obtained from dipping process of these adhesive chemicals onto the polyester surface does meet no satisfactory for all customers. Additionally, an accumulation of chemical particles in the dipping unit during a production cause a running hour very short when compared with other types of polymer. The particle accumulation also leads to other quality problems of tire cord fabric.

This research used Two-Level Factorial design to experiment and study effects of the factors A, B, C, D, E, F and G on the adhesion strength of the tire cord. The results found that the factors A, C and D have no significant effect to the response while the factors B, D, E and F have significant effects to the response at the confidence interval of 95%. Highest adhesion response seems to be appeared the high, low, high, and low levels of the factors B, D, E and F respectively. Steepest ascent method and response surface methodology by Central composite design were applied to determine appropriate levels of the factors B and E which finally improve over 30% of the current adhesion strength under the normal operating condition.