

Natanan Ngarmsa-ard 2013: Investigation on Peel Strength of Compression Overmolded Rubber Parts. Master of Engineering (Materials Engineering), Major Field: Materials Engineering, Department of Materials Engineering. Thesis Advisor: Assistant Professor Somjate Patcharaphun, Dr.-Ing. 108 pages.

The objective of this work was to investigate the bond strength of natural rubber part processed by compression overmolding. The influences of compound formulation and processing parameter such as degree of cure, filler type and content, mold temperature and clamping pressure were our main interest. Furthermore, in order to enhance the bond strength of compression overmolded rubber part, the increasing contact area by using the different surface pattern of substrate and the UV irradiation technique were employed. It can be seen that the bond strength decreased with the increasing degree of cure, while the increase of filler loading in substrate and overmolded rubber tended to increase the bond strength. Considering the effect of processing parameters, it was found that the bond strength increased with the increasing clamping pressure and mold temperature. As a result of the increasing contact area by using the different surface pattern of substrate materials, the bond strength significantly increased. However, from the results obtained by using the UV irradiation technique, the results suggested that the bond strength depends significantly not only on the polarity of material but also the compatibility between them. In addition, it should be noted that the degradation of substrate material can occurs during the long term exposure to UV irradiation treatment which resulting in the decrease of bond strength. It can be suggested that the peel strength of NR overmolded by SBR and NBR was not only depend on the tack property but also the compatibility between a pair of rubbers. In this work, the mathematical model has been developed by using kinetic model for vulcanization and extensively verified against the exiting experimental data. A satisfying agreement between the analytical and experimental results indicated that the proposed model can be employed as a valuable tool for the prediction of peel strength. However, the differences were observed which resulted from some parameters and assumptions made in the derivation of the equation, which could led to errors in the calculations.

---

Student's signature

---

Thesis Advisor's signature