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Simultaneous Optimization of Cost and Properties for a Conveyer Compound Using Taguchi Method with OEC Method

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To optimize four properties of a rubber compound using for top cover of a general-purpose conveyor belt including its curing time, its material cost, its abrasion and tensile resistance, a statistical experimental design method called Taguchi method together with overall evaluation criteria (OEC) methods have been used. The later method is used to combine four considered properties for optimization to one single goal. To imply the Taguchi method, at first step fourteen main factors and 12 interactions are considered and for them an L32 orthogonal array in two levels were used. Statistical analysis of this step showed that interactions are not important and can be excluded from forwarder experiments. Finally at this step 9 factors are optimized and five remained factors are considered for addition works. At second step a L16 orthogonal array in 4 levels was considered and resulted in one factor optimization and reaming of 4 others that are send to next step for additional works. At third step, an L9 orthogonal array in three levels was considered in which all remaining factors are optimized. The final optimized formulation in addition to have better mechanical properties than elementary formulation which has been used several years for conveyer production also showed a cost reduction of 62% including the material and process cost reduction. All experiments at least repeated for two times to be completely sure about our obtained data.