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KNOWLEDGE BASED MODEL FOR POLYMER COMPOSITE DESIGN AND PRODUCTION

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Polymer composites with different mechanical properties can be produced from various polymer matrices and reinforcing materials by different plastic molding technologies. Thus numerous combinatorial ways exist for production of polymer composites. Because of the complexity of the production processes the elaboration of a self-adjusting model is necessary for the effective planning and implementation of the production of composites with the desired properties.

The elaborated model was based on the experimental and expert databases. The experimental database contained the summarized results of our experiments of polymer composite production in the last five years. The results of experiments were divided into five main categories (type of polymer matrix, type of molding process, product property etc.) and more than twenty subcategories (reinforcement concentration, tensile strength etc.). In the expert database the precarious relationships among the categories were fixed based on the literature data and on the expert opinions. In the model adequate search criteria based both on the experimental and the expert databases generate recommendations for the production of polymer composites with determined properties.

For testing the model production parameters for the composites with determined properties were generated, then according to the records various composites have been produced from polyolefin matrices in laboratory conditions. According to the mechanical properties of the tested composites it has been stated, that the laboratory results were in good agreement with the model generated property values. By application of the model composites with similar properties can be produced from different raw materials (polymers and reinforcements) based on the recommendations of the model thus the production cost can be reduced.