ABSTRACT

In the presented thesis the technology of preparation and analysis of mechanical properties of a new polymer-rubber composite were discussed. Potential areas of practical application of the material studied were also indicated.

In the literature review part of the thesis, an analysis of methods for obtaining PET recyclate and rubber granules was made. The possibilities of using the shredded tyres as a filler and modifier of properties of various polymeric composites were presented. The issues connected with composites, a historical outline as well as their classification and application were discussed. Attempts were presented to create a composite of various percentage compositions depending on the content of rubber granules with various plastics and resins. A technology was proposed for obtaining the discussed polymer-rubber composite by combining PET with rubber granules under plasticization and compression. An important feature of the composite is its pro-ecological character and low manufacturing costs, which are a result of using recycled materials for production.

The moulding unit designed especially for this study was discussed, as well as the designed hydraulic press, which was used to mould the composite samples. The methods of verification of the quality of composite samples were presented, beginning with the method for the verification of the external shape using the GOM ATOS optical scanner, to the analysis of the internal structure using the General Electric V/tomex/x microtomograph.

The experimental part includes the presentation of a number of tests carried out on the produced composite. It was shown that a higher content of the filler which is a rubber granulate positively affects the properties of the composite related to the rebound elasticity. Much attention was also directed to tribological and abrasion tests. It has been shown that a favourable method of tribological testing of the composite in question are methods where high unit pressures are not applied, as well as methods where the cooperating elements are not characterised by high roughness. Tribological testing on the T07 tester, which is designed to evaluate the resistance against wear of materials during friction with loose abrasive, has been found to be optimal. Sound insulation testing which was carried out on a conceptual device designed for the thesis is also presented.

Based on the results obtained conclusions were formulated concerning the produced composite and its properties. It was shown that the content of rubber granules as a filler has a positive influence on the acoustic insulation properties. The relation between samples with

different percentage composition and acoustic insulating power at different frequencies has been presented. It has been pointed out at which frequencies the composite samples achieve the best acoustic insulation indexes. Possible concepts of practical application of the material studied have been initially described.