**SUMMARY**

As a result of the tests on systems of acrylic-epoxy coatings (applied as car body paints) aged with ultraviolet (UV) radiation, the main goal of the thesis, i.e., examination and evaluation of the effect of UV radiation on the destruction and mechanical wear of acrylic-epoxy coatings, has been achieved.

The study of the aged coatings morphology (with the use of scanning electron microscopy), revealed a progressing coating destruction in the form of craters, chippings, and microcracks, as well as the areas with a thin physical structure of the coating material. In addition, silver cracks (in the form of ribbings), taking the shape of parallelly arranged bands, were observed on the surfaces of coatings.

The development of aging changes in the chemical structure of the coatings was identified as the main cause of their destruction, while oxidation was found to prevail among the processes destructive to the acrylic coating material, which was confirmed by the results of infrared spectroscopic tests (FTIR). It was shown that the carbonyl (C=O) and hydroxyl (OH) groups content, which is an index of oxidation processes in a coating material, increased with aging time. The progress of aging processes in the structure of acrylic coatings led to a decrease in the temperature of degradation onset in the coating material, which was revealed by the results of tests performed using differential scanning calorimetry (DSC). As a result, thermal resistance of the aged coatings also decreased.

Due to both oxidation and an increase, confirmed by the study, in the Buchholz hardness of the coating surfaces, a higher brittleness of the aged coating layers (the top one and the interlayer) was observed, which was a result of a spontaneous release of small fragments, or particles, of the coating material. This caused a progressing multiple increase in the roughness of the surfaces, which, in turn, led to a decrease in their mirror shine.

The UV aging of the coatings caused also an increase in the chemical activity of the surfaces, as an increased surface free energy (SFE) was observed. In addition, the SFE polar component grew higher as a result of aging changes in the chemical structure of the coatings exposed to UV radiation.

Destruction of the acrylic-epoxy coatings under the influence of UV radiation contributed also to their lowered resistance to bending. However, no change in abrasion or impact resistance of acrylic-epoxy coatings was detected as the time of aging increased.

The proposed methodology of multicriterial studies can be used in the examination of the destruction and aging kinetics of different kinds of polymer coatings; moreover, the methodology in question makes it possible to assess the mechanic resistance of a polymer coating system to abrasion, impact, and bending. The results obtained in the present study broaden the available information on the kinetics and types of destructive processes taking place in UV aged acrylic-epoxy coatings and determining their operational quality (durability). The results can provide a basis for designing new systems to protect the surfaces of technological objects (car bodies) and new decorative-protective coatings with an enhanced UV radiation resistance.

The described methodology of accelerated aging tests for car body decorative-protective coatings enables quick evaluation of their operational quality, which is all the more important that, due to the development of nanocoating technology, car body paint formulas change every five years on average.