

Summary on a scientific theme for the general public

Nowadays the layered cement composites are being more frequently used in residential and industrial buildings and also in indoor car parks. Depending on material, the floor can be made of various materials can be set apart. However, the floors made of cement composites are used most often. The concrete floor consists of the overlay usually made of cement mortar and the substrate. The substrate is usually made of concrete. Taking into consideration the durability of overlay appropriate adhesion between overlay with substrate is demanded. In order to improve the level of adhesion between overlay with substrate various activities can be used. For example: mechanical treatment of the surface of the substrate, removing cement laitance from the concrete substrate, using bonding agents, using additions to the content of overlay mortar etc. Moreover, depending on functional requirements of an object as well as durability, the overlays should have proper strength and functional parameters. In order to obtain the parameters on required level the following additional activities can be used: fibre reinforcement, surface hardening or impregnation. In recent years a vast body of research on using nanoparticles in the field of civil engineering have shown that many characteristics of concrete and mortar can be significantly improved by the addition of nanoparticles. In literature it is shown that cement mortar overlay composition modification by using nanoparticles can increase its adhesion between overlay and concrete substrate, but there isn't enough wider research of the problem. Particularly, it is still lack of results of researching the influence of nanoparticles included in cement mortar of overlay in concrete floors on the level of its pull-off adhesion between overlay and concrete substrate, as well as its functional parameters. Bearing this in mind, the aim of the project is to assess the effect of content of selected nanoparticles in the composition of cement mortar used for overlay of the floor on the level of adhesion between the overlay and the concrete substrate, as well as on functional parameters. The main aim of the project is to select the kind and amount of the nanoparticles addition the positive influence of which on the level of bonding will be noticeable on different levels of observation of the structure of the material. The functional parameters of the layers should be improved or at least not deteriorated. The plan of research consists of performing concrete substrates with different surface preparation. The overlays will be placed on the concrete substrates. They will differ in the amount of selected nanoparticles. Afterwards, the determination of the value of adhesion between overlay and substrate and value of selected functional properties will be evaluated. The interpretation of the obtained results will be supported by the results of microstructural investigations of cement mortars using the scanning electron microscope (SEM) and X-ray micro CT.