Zukunft Bau

STRUCTURE / ABSTRACT

Title

Research on the environmental influences on the durability and wear resistance of frequented surface protection systems during the application process and use phase

Occasion/ initial situation

Frequented surface protection systems are used in reinforced concrete parking structures to protect the construction against invasive substances. Environmental influences are unavoidable on freely exposed surfaces during the application process and the use phase. An assessment of these effects on the durability and wear resistance of the surface protection systems is barely possible without reliable findings.

Objective of the research project

The effects of environmental influences on frequented surface protection systems is supposed to be determined and evaluated during the application process and use phase. In a first series of experiments, the effects of moisture and UV radiation being present during the application and curing time were investigated. A reference sample and three additional test specimens were coated for each surface protection system. Two test specimens were stored under different climatic conditions that lead to surface moisture. Another specimen was exposed to UV radiation and heat by using a sunlight-simulating lamp. After the application of the surface protection systems under aforementioned environmental influences was completed, all samples were subjected to the Parking Abrasion Test (PAT) to determine their wear resistance. The evaluation was carried out visually and by laser scanning. The systems were classified into wear classes, based on the findings of a previous research project.
The second focus was the investigation of the effects of water saturation and the entry of abrasive grit during the use phase of the surface protection systems. To test the water saturation, the coated test specimens were water-saturated and stored in a water filled steel tub during the Parking Abrasion Test. The effect of abrasives was simulated by a defined quantity of grit applied before each Parking Abrasion Test which was specified within the research project.
As a third focus the gained knowledge from the laboratory tests was used to identify methods that can lead to a reduction of the effects of environmental influences in practice, both during the application and the use phase.
The boundary conditions of the laboratory tests within focus 1 and 2 were chosen according to the processing conditions specified in the product data sheets (e. g. surface temperature and ambient temperature) in order to be authentic and realistic. This procedure was used to investigate whether damage and system influences could occur under certain conditions in the application process, even though the manufacturer's specifications were followed.

Conclusion

The aim of the project was to investigate the environmental effects on surface protection systems during the application and use phase and to identify methods to reduce these possibly negative effects.
The laboratory tests showed that, depending on the chemical basis of the binder and the selection of the surface protection system, the examined environmental influences can have a significant impact on the wear resistance and durability of the products, which are currently not considered in standardised laboratory tests. Through targeted product selection and precise planning, the surface protection system can fulfill its purpose and protect the construction from damaging substances for longer.

Key data

Short title: Environmental influences on the wear resistance of surface protection systems

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Images

Figure 1: Experimental setup of the Parking Abrasion Test

Figure 2: Parking Abrasion Test under water saturation

Figure 3: Implementation of the Parking Abrasion Test under the influence of grit

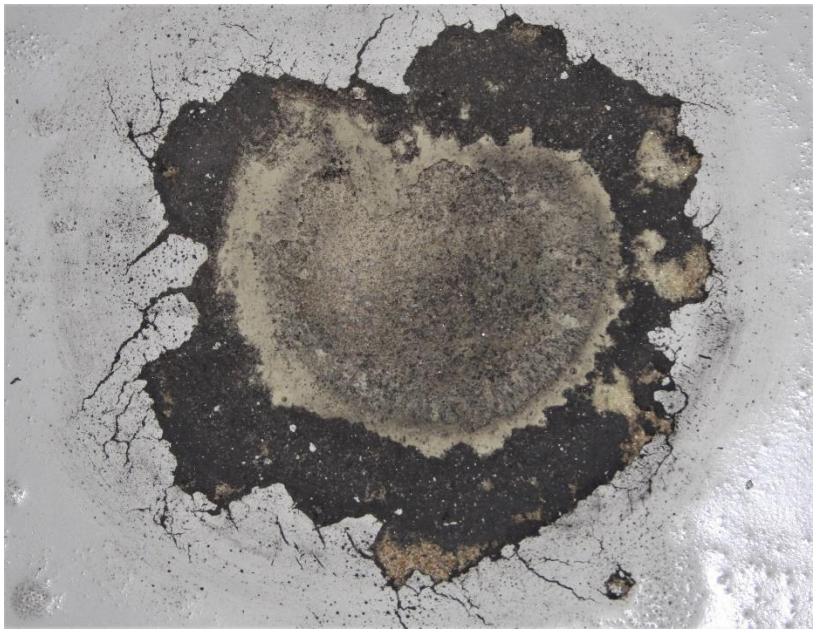

Figure 4: Blistering, intense material removal and harmed layer bonding of a 11a-system in case of surface moisture during the application after the Parking Abrasion Test