An innovative way to repair damaged concrete floors using epoxy adhesives

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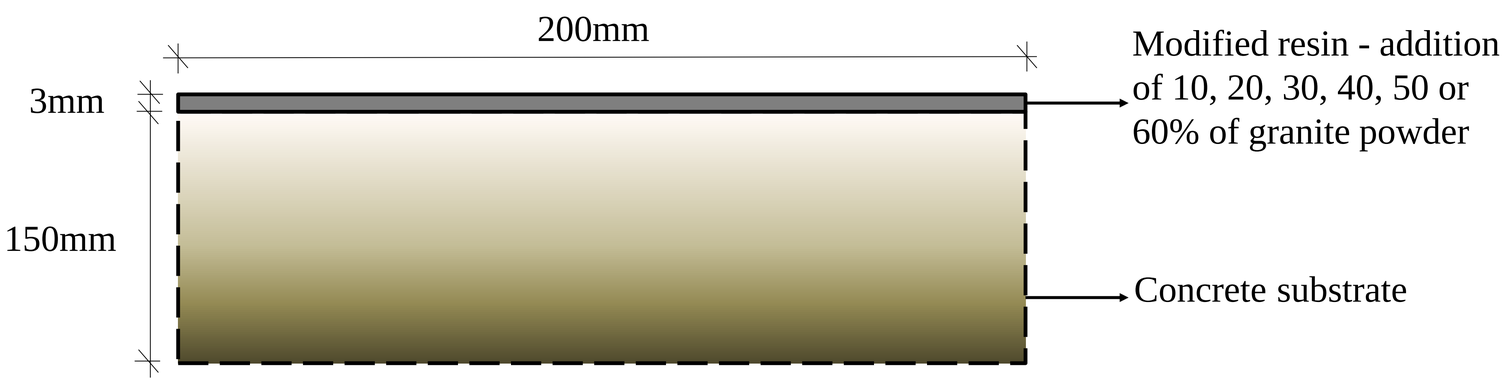
Introduction

We live in a time when the construction of new buildings is becoming more and more expensive. An alternative way is to renovate the already existing facilities, including its sub-standard elements, e. g. concrete floors. Therefore, a solution aimed at strengthening or repairing such substrates, e. g. by applying epoxy coatings, is found more and more often. In the literature, there are many examples of modifications of this type of coatings, increasing their strength and resistance to thermal shock, using polypropylene fibers [1], polymers [2] or carbon nanotubes [3].
In the described test, the primer layer of the epoxy coating was modified with granite powder in the amount of 10% to 60% in relation to the weight of the resin.
A reference sample was also made to compare the obtained results. The peel strength of the epoxy resin coating was tested for each configuration and the results were compared with a reference sample. The highest pull-off strength of the coating was observed for the substrate with the addition of 20% granite powder (an increase of 18% compared to the reference sample). In addition, an increased resistance to thermal shock was observed.

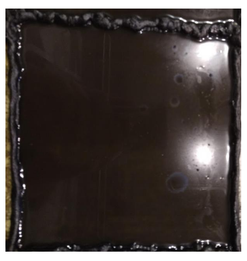
Description of the study



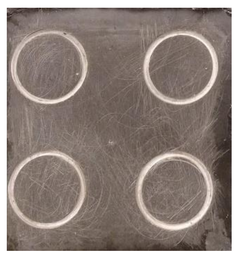
The test began with the preparation of the substrate, made of C30 / 37 concrete, S3 consistency, supplied by a specialized company. After its full hardening, the surface was ground and degreased. The resin used consisted of two components: A and B. After the first component was measured out, a measured amount of granite powder was added. After mixing, component B was added and mixed again. The modified resin was then applied to the substrate to obtain a 3mm layer.

The study examined the effect of adding 10%, 20%, 30%, 40%, 50% and 60% of granite powder to the epoxy resin layer.

Results



Resin-flooded sample



Drilling holes for discs

Sticking discs

Adhesion test

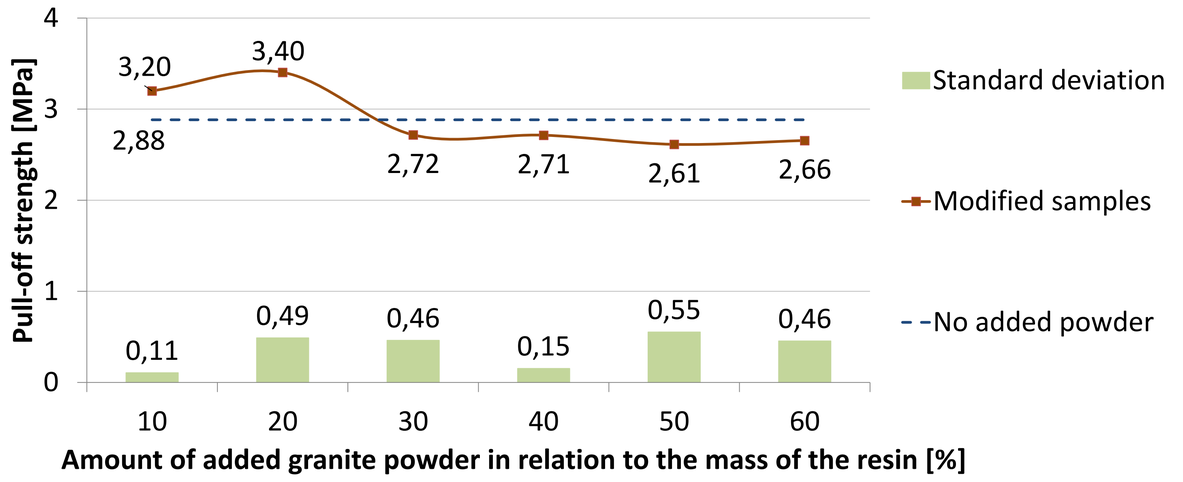


Fig. 1. The dependence of the strength on the amount of granite powder added

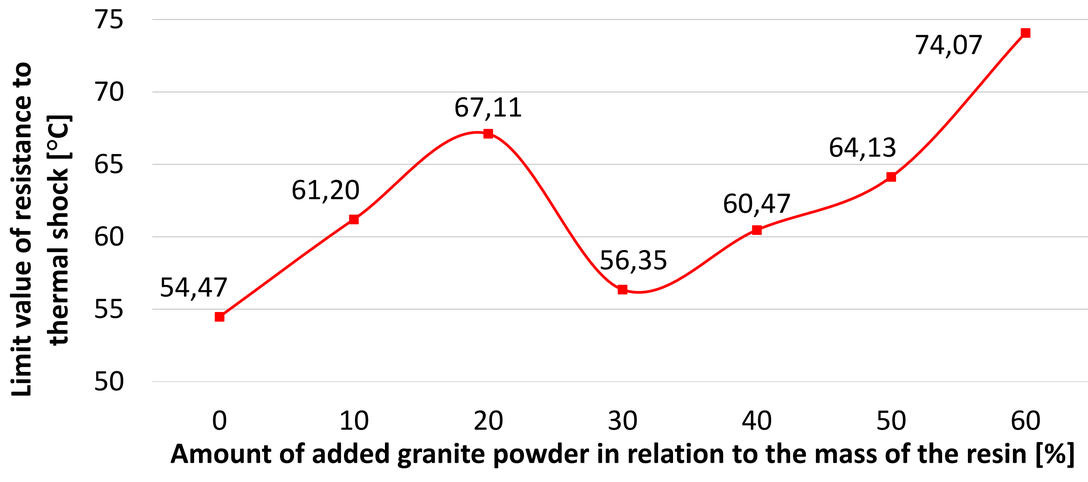


Fig. 2. Dependence of the thermal shock resistance limit on the amount of granite powder added to the resin.

Conclusions

The highest pull-off strength of the coating was observed for the substrate with the addition of 20% granite powder, which obtained the result of 3.40 MPa (an increase of 18% in relation to the reference sample - 2.88 MPa). The second best result was the addition of 10% granite powder (increase by 11%). In Figure 2, the relationship between the resistance to thermal shock and the amount of granite powder added is related to the relationship between the pull-off strength and thermal shock resistance. Due to the low cost of granite powder, this study showed that we can easily reduce resin coating costs while increasing pull-off strength and thermal shock resistance.

References

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