

Removal of concrete surfaces

The presented work describes the development of a method of removing contaminated concrete surfaces by using laser technology. The project originated from an initiative of our cooperation partner *Institut für Kernenergie-technik der Technischen Universität Dresden* under coordination of Prof. Dr. rer. nat. J. Knorr.

Laser treatment of concrete produces a vitreous matrix in which the radioactive isotopes are embedded and which can be separated in liquid state from the concrete surface. After separation and solidification the waste products remain as a vitreous granulate material. (Fig.1).



Fig.1: vitreous granulate material

In this way the contaminated material can be concentrated in a highly enriched fraction and separated from the bulk of uncontaminated material.

To produce a melt bath with a sufficient depth systematic investigations were carried out with concrete with a maximum grain size of 10 mm as well as with quartzitic, limestone and mixed concretes employing either a CO₂ laser, or a Nd:YAG laser or a high power diode laser of adequate power for comparison.

Vitrification behaviour was studied and different techniques of removing of the melt were tested.

Next to the type of material, abrasion is substantially influenced by the process parameters and by the manipulation or control of the expelling gas jet. The settlement with a pulsing jet in combination with the employment of a high power diode laser proved to be most effective and was applied by Laserinstitut Mittelsachsen e.V. as a patent. Employing a high power diode laser of 2,6 kW, for example, it is possible with the developed method to achieve an ablation rate of 2300 cm²/h at a ablation depth of approx. 3 mm. In combination with the pulsing gas jet a molten layer of 5 mm depth can be removed in a single run. This zone normally contains about 95 % of the contaminants (Fig.2).



Fig.2: surface area of concrete after laser treatment

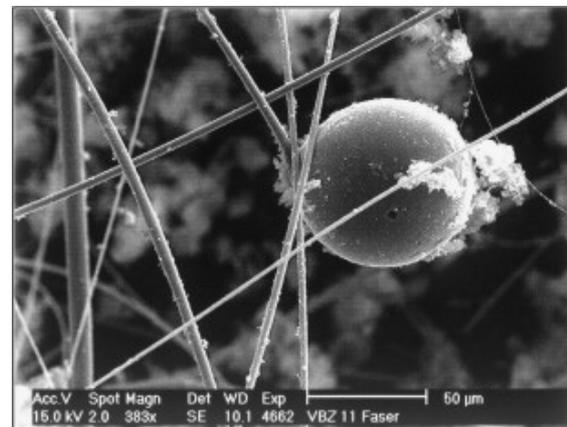


Fig.3: REM - photo: fibers and fine particulate

Besides as the vitreous granules the remnants of the process are also obtained as fibers and fine particulates (Fig.3).

Detailed information are available in the proceedings of Kontec 2005, Berlin, taking place in April.

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