FLYING CONCRETE DESK

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A concrete desk is flying in the new entrance building of the Technischen Universität Darmstadt „karo 5“ since January 2010. The installation has a length of more than 7 m and with of 1 m. It will give the platform for the planed permanent exhibition regarding the history, the current activities and the future projects of the TU Darmstadt. For it, information boards and touch screen terminals will be integrated in the concrete slab.

Fig. 1: Flying concrete desk in the entrance building of the Technische Universität Darmstadt before installation of the information panels

The challenge for the designer was to create an apparently flying exhibition desk. At the same time a stable position of the object was required. It was chosen a concrete panel of 6.5 cm thickness fixed by thin steel-chords. The last should have irregular positions to hinder an understanding of the support at first sight und enhance the impression of flying.

Planning the structure, the aim was mainly the limitation of the vertical deformation and cracking width in the reinforced concrete panel as well as the horizontal displacement.
Static as well as dynamic horizontal loads induced by people were to consider in the analyses.

Chords are restricted to carry only tensile forces. Considering a horizontal load, the equilibrium of forces can be achieved by the transfer of forces between chords of different inclination. To limit the deformation, pairs of chords were fixed in V-shape at the panel. The weight of the concrete panel provides high transfer forces and therefore a high stability of the installation. The optimisation of the arrangement with 12 steel-cables Ø 8 mm based on the preliminary draft and was supported by numerical simulation. It was achieved an apparently chaotic position of the cables considering the required clearance.

![Fig. 2: FE-Model of the concrete slab including the steel cable (left), joint between concrete slab and steel cable (right)](image)

A special focus was on the design of details. The links between the concrete panel and the steel chords as well as the links between chord and ceiling were planed accurately and build with stainless steel. They give a wonderful contrast compared to the rough concrete surface.

The design of the table installation was realised by Fuenfwerken Design AG, Berlin in cooperation with the Institute for concrete structures and materials, supported by the Section Communication of the TU Darmstadt. Furthermore the detailed planning, design and construction of the concrete slab and the cable construction, including the links and supports was carried out by the Institute for concrete structures and materials. The concrete member was produced in the precast concrete factory Dressler Bau, Stockstadt/M.

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