

Load-Bearing Behavior of Textile Reinforced Concrete Structures

Textile Reinforced Concrete (TRC) is a new composite material of fine-grained concrete matrices reinforced with mesh-like technical textiles. The primary materials used for the reinforcement are carbon or alkali-resistant glass fibers. Due to the non-corrosive behavior of these fibers, concrete covers can be reduced significantly compared to steel-reinforced concrete members. The results are slender and lightweight structures with high-quality concrete surfaces. Today, the first applications like façade structures (large-sized ventilated façade panels, sandwich panels), pedestrian bridges (Figure 1), and shell and grid structures have been realized.

In the last twelve years, the main properties of textile-reinforced concrete have been examined in Germany, and calculation models have been derived from tests on TRC members. An actual research task is the load-bearing behavior of textile reinforcements, which are impregnated, e.g., with epoxy resin. Due to the impregnation of the textiles, tensile stresses can be two or three times higher than those without impregnation. In a wide-range testing program, tensile, shear, and bending tests (Figure 1) must be performed. The test results will provide calculation models for impregnated textile reinforcements.

Another aspect that has yet to be entirely researched is the behavior of TRC structures, e.g., bridges and bond structures as wood-carbon concrete. Therefore, load-bearing tests will be carried out. The single components' bearing behavior must be analyzed in tensile and compression tests. The interaction between textile and concrete will be tested on composite members in tensile and bending tests.



Figure 1: Pedestrian bridge during a load-bearing test

Scope of the internships, applied study semester, or thesis.

The main task during the internship will be the execution of tests on TRC members (tensile, bending, and shear tests and some more) and the interpretation of test data (i.e., assembling test data in diagrams).

Special requirements

No knowledge of TRC construction is required. The intern will work in our laboratory and our office at the university. Basic knowledge of Microsoft® Office applications (Excel, Word) is assumed.

Qualification level: Advanced Bachelor's degree or Master's degree

Programs lines: SRI, A2S, BA/MA