The standard test used to characterize the performance of a fiber-reinforced sprayed concrete is the round or square panel test. Steel and macro synthetic fibers with different physical properties are commonly used as reinforcement. The test panel is usually prepared by spraying shotcrete into a steel mold and, after curing, performing a three-point bending test. The difficulty of this kind of preparation is to know where the fibers are located and how many have remained in the sample. There are plenty of factors affecting the fiber distribution, such as the type of shotcrete, wet or dry mix preparation and application techniques and skills. Also important is the setting time, which impacts the rebound of the fibers and the fiber content. The fibers are randomly oriented in the test specimen, as there is a three-dimensional structure and any one fiber can be oriented in any direction.

For the development of a mix design, a preferred method should be a test set up in which the interaction between a fiber, the used additives and the total mix design of the concrete can be compared one at a time. A panel test should be the final step in confirming the findings of the laboratory investigations.

After trying several different test set ups, we found a way of testing a single fiber in a uniaxial test specimen. To simplify the mix design, we removed the coarse sands above 1 mm diameter, as we can consider them as fillers with limited impact on the interface between the fiber surface and cement paste. The remaining formulation contained OPC (ordinary Portland cement), fine sand, fine carbonate, stabilizer, plasticizer and polymer binder. The fiber itself was located in the center of a concrete specimen poured from a mixture that was freshly prepared each time.

The laboratory testing showed the interaction between polymer-modified concrete and macro synthetic fibers and it was also possible to demonstrate the different stages of the pull-out process out of the concrete specimen.