

## NOVEL BI-COMPONENT FIBERS FOR CONCRETE



### Problem – Challenge

The reinforcement of concrete with fibers is an economical and durable alternative to conventional steel bar reinforcement in many cases. For years, steel fibers have been the first choice whereas polyolefin-based fibers generally were thought to be less suitable for this purpose. However, co-extrusion processes nowadays allow the production of polyolefin-based bi-component fibers with high tensile strength and high elastic modulus. Bi-component fibers are manufactured by two extruders. The molten polymers are passed through a spin-pack with two separate material inflows, so that when leaving the spinnerettes they join together forming a fiber consisting of a core and a sheath. Core and sheath material consist of two different polymers which allow an independent optimization of the surface and core material.

### Solution

Such bi-component fibers were developed within a CTI-project between Empa and the company fibrotec AG. The bond to the cementitious matrix was drastically improved by high drawing of the fibers, incorporation of additives and nanoparticles to the sheath, and structuring of the surface. High stretching grades are achieved by a more flexible sheath confining the stiffer core polymers. This led to significantly improved load bearing capacity in the composite so that steel fibers can be replaced easily through the novel bi-component fibers. Furthermore, a novel packing method where the single fibers are packed in bundles confined by a water soluble foil, which dissolves upon adding to the fresh concrete, was introduced. This allows easy and excellent fiber dispersion in the concrete. These bi-component fibers are now successfully produced by the company Brugg Contec AG.

