Abstract: Even though modern ski bindings can prevent tibia fractures they are still unable to reliably protect the knee. Attempts are therefore made to develop mechatronic concepts to implement additional release criteria. In order to systematically test and optimize such new bindings an artificial instrumented knee joint is currently being constructed at our Institute. A major challenge in this development is to measure the tension forces in the artificial ligaments. To provide this demanding measuring, a novel sensor fiber made of silicon rubber and filled with carbon black was used, which alters its electrical conductivity due to elongation. The fiber itself was either bonded or sewn on the synthetic ligament (LARS, Corin Group PLC, UK). To check the linearity, reproducibility and accuracy of the new measurement unit, tensile tests have been conducted using a similar method as proposed by another study on sensor fibers. As a result, the tests revealed good quality of the developed measurement application, showing minimal variance and high reproducibility. Thus it turned out to be a reliable and appropriate tool to record forces in a uniaxial direction making it an interesting device not only in our application but generally as a method to measure tension in sports apparel and other fabrics.