As can be observed from the aggregate of simulation results in the Abaqus program, in contrast to the experiments, in the ideal model of a flexible cylinder, hysteresis does not exist in the numerical calculation of the force at the end of the fiber as a function of length-shortening between its two ends. Similarly, the force exerted by the fiber on the flexible cylinder wall increases from the moment the fiber comes into contact with the wall, until it reaches its maximal fixed value. The magnitude of the fiber’s force on the wall as a result of its shortening can contribute to understanding the existing mechanism and to helping future applications create barriers for preventing damage to the cylinder resulting from the insertion of the fiber into the cylinder. Additionally, because greater values of force, are obtained in comparison for a Ø2.4 mm fiber in comparison to a Ø1.8 mm fiber, it can be concluded that fiber diameter affects the developing forces acting on the cylinder. The comparative graph of the forces acting on the fiber as a function of its shortening in the two simulations in flexible and stiff cylinders shows that different behavior was observed in each. These results emphasize the importance of this study’s innovation regarding flexible cylinders, which differs from other studies carried out on stiff cylinders. See, for example [23]. In a similar manner, a comparable result is obtained when comparing the two experiments using flexible and stiff cylinders. Here, again, the difference in behavior of the two fiber diameters, 1.8 mm and 2.4 mm is clearly observable. The existing mathematical model for this study is compatible with the experimental results, both for calculating only slight movement as well as for calculating larger ones. In the stretching and compression experiments with the cylinders, a difference in the behavior of the flexible cylinders of various diameters can be observed, which affects subsequent cylinder behavior during the various experiments. In the experiment comparing the force as a function of cylinder shortening, flexible cylinders with diameters of Ø32 mm and Ø42 mm are found to exhibit behavior similar to that of a flexible cylinder with a Ø74 mm diameter, which subsequently affect experimental results primarily with regard to axial movements of the cylinders, The change in distance between the cylinder’s center and the vertical axis at the experiment's start is a function of the shortening of the fiber. In the experiments measuring force as a function of fiber shortening conducted to determine the initial contact, which is the critical point of stress causing collapse, the transition to 3D deformation, the examination of the hysteresis, reveals again a dissimilarity between the different cylinders during first contact, followed by the transition to 3D deformation. The values for critical stress are comparable and a hysteresis exists for each of the cylinders. The values for the force upon the end of the fiber, as a function of its shortening, are consistently large for a Ø2.4 mm fiber compared to a Ø1.8 mm one. This result is also observed in experiments with stiff cylinders. In subsequent experiments with greater shortening between the fiber ends, the presence of a hysteresis for all cylinders and the different axial movements for various cylinder sizes can be observed.. The comparative graphs of cylinders of various diameters show that a Ø32 mm cylinder obtains higher force values than a Ø1.8 mm fiber. But a Ø2.4 mm cylinder obtains an even greater force than a Ø42 mm cylinder. These results indicate that the forces developing during the process affect both the fiber and the cylinders. In the comparative graphs of axial movement as a function of fiber shortening, higher values are obtained with Ø32 and Ø42 mm cylinders than with a Ø74 mm one, thus demonstrating the effect that large cylinder diameter has on cylinder movement. Accordingly, this has implications for a number of applications. As previously mentioned, it was consistently observed that large forces were obtained on Ø1.8 mm fibers in contrast with Ø2.4 mm fibers with the same amount of shortening. As can be seen in the comparative graph, these forces can reach up to 3x the fiber shortening in a flexible cylinder and up to 4x as much in a rigid cylinder. In the last section of the presentation of the experimental results and the comparison to the numerical simulation, good compatibility for the Ø42 mm flexible cylinder for Ø1.8 mm and Ø2.4 mm fibers, and the force obtained at the fiber ends as a function of their shortening can be observed. These positive compatibilities demonstrate that we now have a computational tool that can be used for a variety of cylinder diameters in numerous engineering and medical applications.