The solution of felting shrinkage, a basic problem for woof fibre processing, was investigated in present study through developing nanocomposite treatment containing shape memory polyurethane and cellulose nanowhiskers. Nanocomposites containing different cellulose nanowhisker concentrations (5, 10, and 20 wt%) were applied to woven wool fabric by a pad-dry-cure process. The results indicated that as cellulose nanowhisker concentration was increased from 0 to 20 wt%, the shrinking rate of treated wool fabrics decreased both in warp and weft directions. The existence nanocomposite on wool fabric was confirmed by FT-IR and SEM analyses. Compared with neat SMPU, treatment made with nanocomposite including cellulose nanowhisker enhanced rigidity, tear strength, anti-felting and weight loss performances of the wool fabric after repeated washing cycles.