In this study, an innovative method consisting of electrospinning and conventional textile production techniques was built up to produce hybrid yarns enabling the production of functional textile products. The principle of the developed method is to open the twist of spun yarn, make this fibre bundle conductive for use as a collector, collect the electrospun nanofibres onto the conductive opened fibre bundle and finally twist this structure to produce hybrid yarn. To determine the feasibility of the developed method, surface morphology, chemical composition, coating features and tensile properties of the hybrid yarns were compared with that of the pure yarn and nanofibre-coated yarns produced without untwisting and retwisting processes. Test results demonstrated that untwisting process in hybrid production method provided the application of nanofibres interior structure of the spun yarn while retwisting process made integration of classical textile fibres and nanofibres together and hence locking the obtained yarn structure effectively. Thanks to the integrated structure, it was successful to get the yarn have the required tensile properties for weaving, knitting and other processes. Three minutes was determined as the optimum coating time for the effective nanofibre deposition and tensile properties. Summing up the results, it was believed that the method helps to benefit from the special properties of nanofibres for the functional yarn production together with durability and higher tensile properties of the spun yarns for larger usage areas. The presented findings could encourage the researchers to commercialize the method in order to get nanofibre-coated functional yarns.