Shape memory polymers are smart materials that could exhibit significant changes in their properties with effect of environmental stimuli. In recent years, studies covering shape memory polymers, a branch of smart textiles, have focused on temperature and water/humidity sensitivity. In literature, textile applications of shape memory polymers consist of fibre spinning, yarn and fabric formation, film, coating, lamination and finishing application. In this study, structural and shape memory mechanisms of shape memory polymers were explained and applications related to transformation of shape memory property from polymer to textile material were examined in detail. Furthermore, limitations of shape memory polymers in the mentioned textile production processes and their potential applications in near future were also discussed.