# IMPROVING SEWABILITY OF 100% COTTON SINGLE JERSEY FABRICS USING SOFTENERS

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Sewability means the ability and the ease of 2D fabric pieces to be qualitatively and quantitatively sewn into a 3D garment. Sewing damage due to poor sewability is one of the most troublesome problems for knitted fabrics faced by apparel manufacturers. Sewability depends on various parameters like fabric construction, structural parameters of knitted fabrics, fabric finishing treatments, sewing needles and sewing machine parameters. To reduce sewing damage, needles should have the ability to penetrate the fabrics easily. The L & M sewability tester can be used to measure the sewability of a fabric and sewability is expressed based on the sewing needle penetration force indicated by the tester. Low sewing needle penetration force means good sewability. Fabric softeners are fabric finishing agents that makes fabrics soft, brilliant, greasy and more elastic resulting inacceptable handling.

For this study, 100% cotton single jersey fabrics from three different fabric areal densities (GSMs) with three stitch lengths were used. They were treated with silicone and cationic softeners with three different concentrations (10 g/*l*, 20 g/*l* and 30 g/*l*) and tested for sewability using three sewing machine needle sizes. The sewability values that were obtained are recorded and statistically evaluated. Needle sizes and softener types and concentrations were selected based on industrial applications in Sri Lanka. According to the results, needle penetration force has a positive correlation to the needle size. Because needle size is measured based on the diameter of the groove, the higher needle sizes have higher thickness at the groove area, which requires more force to penetrate the fabric. This may damage the fabric and possibly deform the knitted structure and unravel the knitted stitches in the fabric, which in turn will reduce sewability. Thus, needle penetration force demonstrates a negative correlation with stitch lengths. With lower stitch lengths, fabric cover factor is higher (denser the fabric) and has more stitch densities and therefore higher force is required on the needle to penetrate the fabric, which may also cause to damage the fabric and reduce sewability.

Fabrics treated with cationic softeners and silicone softeners show comparatively good sewability than untreated fabrics. When compared with the results obtained from treated fabrics, the silicone softener treated fabrics demonstrate better sewability than cationic softener treated fabrics. When using both softeners, the highest concentration, 30 g/*l*, gives the lowest needle penetration forces, and further, the needle penetration forces given by silicone softener-treated fabrics are comparatively lower than that of cationic softener-treated fabrics. Therefore,

silicone softeners improve the sewability of 100% cotton single jersey fabrics more effectively compared to cationic softeners, and for best sewability results, the softener solution with the highest concentration (30 g/*l*) can be recommended. Even though, silicone softeners give better sewability (lower needle penetration force) compared to cationic softeners, silicone softeners are double in price compared to cationic softeners in the market. However, it was found in the literature that silicone softeners give very important finishing effects on fabrics and garments in addition to sewability. Nevertheless, from a commercial point of view, cationic softeners are economical for use in the apparel industry to minimize seam damages and improve sewability. Therefore, apparel manufacturers have to select a suitable softener to improve the sewability of fabrics while considering cost effectiveness as well.

Keywords: Sewability, Single jersey fabrics, Cationic softeners, Silicone softeners, Needle penetration force.

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