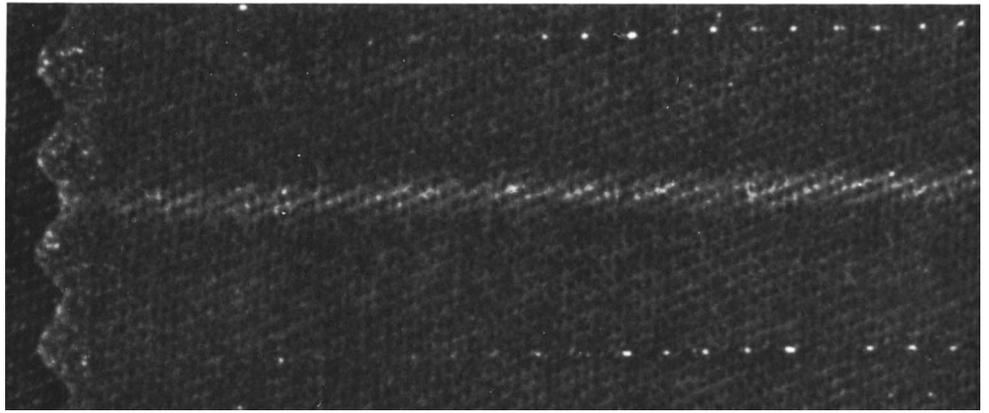


Fig. 1. Varying amounts of abrasion along fabric crease caused by laundering. Left to right: slight, moderate, severe.



Laundering methods affect fabric wear

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As much as half of the wear on fabrics during use may occur in laundering. Consequently, it is important to control the laundry process so that good appearance and adequate soil removal are balanced with minimum abrasive damage. Abrasion may occur both in washing and in drying, and studies have shown that water quality, detergent type, and drying conditions are important variables affecting the amount of damage. Figure 1 shows varying amounts of abrasion that can occur along a fabric crease after repeated launderings.

To evaluate the effects of laundry variables on fabrics, wear studies and laboratory investigations were conducted, using polyester/cotton and 100 percent cotton durable-press fabrics.

Wear study

For the wear study, 27 men wore trousers of 50/50 polyester and cotton for 60 wash/wear cycles. A balanced incomplete block design with four laundry treatments was used. The treatments were as follows: (1) normal—4-pound load, high agitation speed (72 oscillations per minute) in wash, high spin speed (515 revolutions per minute) in wash, 14-minute wash period, softened water at

140° F for wash, 0.23 percent solution anionic detergent, dry at high temperature for 30 minutes; (2) wrong side out—same as normal treatment but with samples turned wrong side out during wash and dry; (3) long dry—same as normal but with 40-minute drying time; (4) short wash—same as normal but with 8-minute wash time.

The 50/50 polyester/cotton trousers had good resistance to damage from wear or laundering. After 60 wash/wear cycles, differences in appearance and amount of abrasive damage due to laundry treatment were too small to be considered significant.

For an indication of the damage resulting from laundering, the trousers that were worn and laundered were compared with trousers that were only laundered. Both the visual rating of the abraded creases and the breaking strength measurements indicated that approximately half the damage was due to the laundry process.

Laboratory study—blend fabrics

In the first laboratory study, cuff samples were constructed from four fabrics of 50/50 blends of polyester and cotton. The samples were subjected to 80

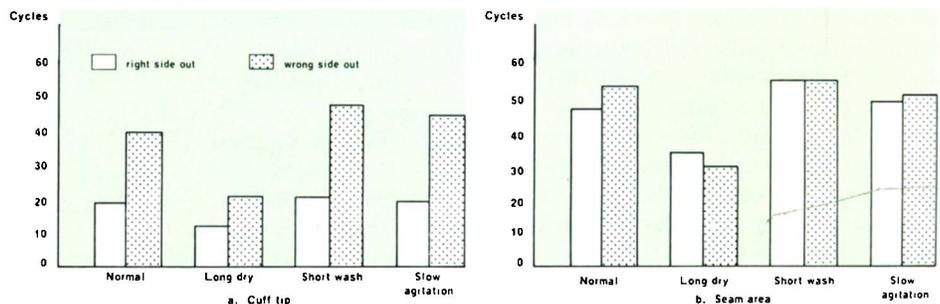
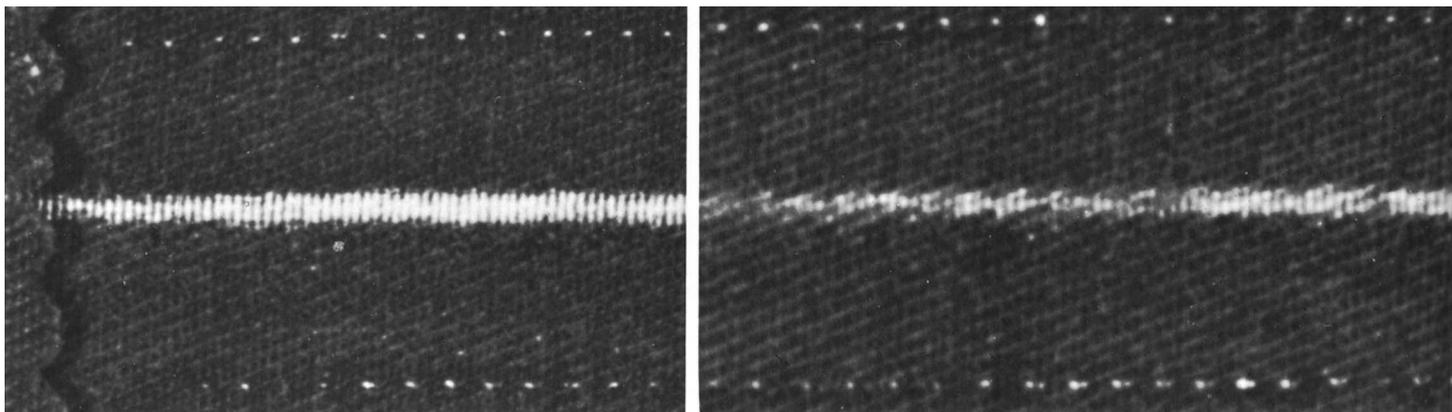


Fig. 2. Effect of laundry treatment on number of cycles until minor damage occurred on cotton durable-press cuffs (the fewer the cycles, the greater the abrasion).



laundry cycles using the following treatments: (1) normal—same as wear-study treatment; (2) wrong side out—same as wear-study treatment; (3) long dry—same as wear-study treatment; (4) short wash—same as wear-study treatment; (5) cold wash—same as normal, except wash and rinse temperatures were approximately 80° F; (6) slow agitation—same as normal except slow agitation speed (36 oscillations per minute) used during the wash cycle; (7) nonionic detergent—same as normal, except nonionic detergent used in place of anionic detergent; (8) softener—same as normal, except 15 ml cationic fabric softener added during rinse; (9) bleach—same as normal, except 237 ml sodium hypochlorite bleach added during wash cycle; (10) enzyme presoak—same as normal, except preceded by a 1-hour soak period with 58 gm enzyme presoak product.

Results varied with fabric and area of evaluation, but washing wrong side out, using slow agitation speed, or using a shortened wash cycle resulted in the least edge abrasion. Drying for a long period, using an enzyme presoak, or washing in cold water tended to result in the most edge abrasion. The increased edge abrasion on enzyme presoak samples may have been primarily mechanically caused,

because the cuffs received an additional spin and rinse cycle as well as the soaking period.

Edge abrasion along the crease appeared to be related to crease sharpness: the sharper the crease, the greater the edge abrasion. Crease sharpness was best preserved by the cold wash, hence the increased abrasion in this treatment.

This laboratory study indicated that some laundry variables could be relatively important in edge abrasion, especially if the fabric is prone to abrasive damage. The investigation was continued, using a cotton durable-press fabric.

Laboratory study—cotton fabric

Cotton broadcloth cuffs were laundered by one of the following methods: (1) normal—same as described previously; (2) long dry—same as normal but with 50-minute drying time, including 10 minutes without heat; (3) short wash—same as normal but with 7-minute wash time (500 total oscillations of agitator); (4) slow agitation—same as normal, except slow agitation speed used during the wash cycle (500 total oscillations of agitator). Half of the cuffs in each treatment were turned wrong side out throughout the entire treatment time

of 70 wash-dry cycles.

The amount of abrasive damage on the cuffs was evaluated by counting the number of laundry cycles it took for damage to occur on the cuff tip or along the seam area and by evaluating the amount of abrasion on warp and hem creases. Figures 2 and 3 show that overdrying durable-press fabrics is the greatest potential cause of edge abrasion in laundering. Cuffs that were repeatedly washed and then dried to 2.8 percent moisture (long dry) had significantly more edge abrasion than those washed and dried to 5 percent moisture (normal dry). The blend cuffs in the other laboratory study also had consistently greater abrasion from the long-dry treatment than from the normal-dry treatment.

Turning the cuffs wrong side out effectively reduced edge abrasion along the warp crease and at the cuff tips (fig. 2 and 3). Because cuff tips are so vulnerable to abrasion, turning a garment wrong side out during the laundry process could add significantly to the wear life. Wash time and agitation speed did not have as striking an effect on abrasion as did drying time.

Conclusions

Home laundering procedures that may minimize abrasion are tumble drying garments no longer than necessary to achieve desired moisture content; turning garments wrong side out during washing and tumble drying; and using the lowest agitation speed or shortest wash time possible to achieve soil removal.

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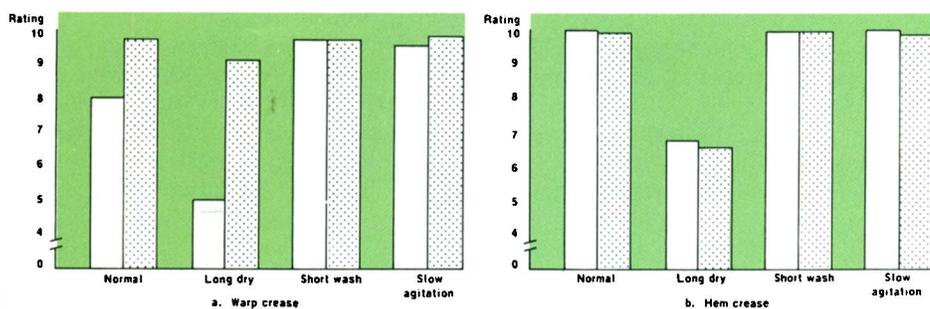


Fig. 3. Effect of laundry treatment on edge abrasion rating of cotton durable-press cuffs (the lower the rating, the greater the abrasion).