

# Laying the ghost of pile reversal

A SPECIAL REPORT BY GEOFF CRAWSHAW

WHEN a customer complains of lines like watermarks and large areas with apparent stains, the carpet manufacturer groans inwardly. Another case of pile reversal! He knows that the case is likely to result in ill-feeling and dissatisfaction in the mind of more than one party. No one is to blame: there is no question of faulty manufacture; the carpet was sold in good faith and the fitter did his job well. The customer has a problem which is not his fault, but neither can he find anyone to accept responsibility. Shading is sometimes described as an "act of God": it would be more appropriate to blame the Devil!

## What is pile reversal?

In Document N278, Sub-Committee 12 of ISO Technical Committee 38 issued a revised wording which is eventually expected to enter ISO 2424. "Pile reversal. An irreversible localised change in orientation of the pile of a textile floorcovering. This phenomenon has

larger carpet manufacturers have also researched the problem from time to time. No definitive rules as to how to guarantee freedom from pile reversal resulted from this work, so researchers have tended to become discouraged. However, a great deal of useful information was generated, and this has not received the publicity it deserved.

## Which carpets are prone?

Permanent shading can occur in cut pile carpets of any fibre or manufacturing technique. It has been observed in tufted, Wilton, bonded and hand-knotted car-

The engineering of the pile yarns believed to have a strong influence on the propensity of the carpet to shade. Because of the absence of a laboratory test for shading, the effects of yarn parameters have not been comprehensively investigated.

Quite apart from inherent proneness to pile reversal, carpets vary tremendously in their optical properties and the extent to which they exhibit shading. Complaints of pile reversal are very rarely received of patterned Axminsters simply because the eye is attracted more to the design than to any shading marks that may appear. On the other hand, very dark colours accentuate the side/end differential in colour of yarn so that when shading occurs in a dark plain carpet it can be very prominent. Similarly, yarns spun on the parallel system tend to give lustrous piles that display pile reversal prominently.

## The influence of location

Cars are not particularly susceptible to accidents until they are taken out of the showroom and onto the roads. Equally, carpets become vulnerable to the accident of pile reversal only when installed and there is no doubt that some locations promote it.

If a shaded carpet is taken up and replaced by new carpet, the pile of the will almost invariably reverse too, although the pattern of shading will be almost identical. This pattern is related either to the configuration of the building or the flow of traffic. Cases of permanent shading in a ship's carpet have shown symmetrical patterns on the port and starboard sides, and a sister ship produced a similar pattern of shading. When a block of flats is carpeted throughout with the same pile carpet, shading marks identical to within a few centimetres have been known to occur in all apartments.

\* polyamide = nylon



Diagram of pile reversal.

different names in different countries". "Shading" is considered by the ISO sub-committee to be a more general term covering the "temporary shading" that can be removed by vacuum cleaning, and "tracking", a gradual change in appearance from edge to middle caused by repeated walking, as well as "pile reversal", which is sometimes referred to as "permanent shading".

## Why does it occur?

An awful fact about pile reversal is that it can occur within a few weeks of installing the carpet under the influence of quite light traffic.

When looking at a carpet showing pile reversal, light will be reflected from the pile side of the area leaning away from the observer so that this area looks light in colour, whereas the pile leaning towards the observer presents yarn ends which reflect less light and appear darker. With irregular demarcation between the areas of differing pile lay, the customer's often-used description "watermarking" can be understood.

The carpet trade and industry are lucky that shading is not a much more common problem. But under what circumstances does shading occur, and how can it be prevented?

These questions are usually answered by a shrug of the shoulder. But a great deal of research has been done over the years, especially at Institut Textile de France, Deutsches Teppichforschungs-

pets; in piles composed of wool, acrylic, \* polyamide, polypropylene and viscose; and with backings consisting of both natural and synthetic materials.

Nor is pile reversal confined to carpets. It also occurs, for example, in cotton pile upholstery and in pile fabric apparel. Pile reversal is very commonly seen on coir doormats (but customers do not complain because these items are bought to be abused and not for their aesthetics!).

In fact it is generally agreed that the better quality carpets generate a higher proportion of complaints of shading. It is not just that customers expect perfection from highly-priced carpets: it is the high dense piles that are prone to pile reversal. A high pile can turn over more easily and examination of cases reveals that the pile is often laid not from the base but from two-thirds the way up the tuft. And the very density of the carpet tends to cause the tufts to be locked together in the biased configuration—at the other extreme of density, a shag pile can be raked in any direction.

**"SHADING IN QUALITY CUT PILE CARPETS.** Some installation of cut pile, velvet or velour carpets develop irregular light and dark areas called 'Shading'. This is caused by some pile yarns changing direction which alters the way light is reflected or absorbed by the carpet. The factors which cause permanent shading are not fully understood and its occurrence cannot be predicted or prevented, although there is a strong connection between location and shading. It is not a manufacturing fault and it has no detrimental influence on the durability or life of the carpet. However, as the appearance of a carpet may be affected by shading you