Rub resistance

It is essential for an ink or varnish film to be durable in normal handling. This means that the ink or varnish film must not become marked, scuffed or smudged when the printed or varnished surface is in moving contact with other surfaces, usually metal or plastic. Moving contact of this type takes place on conveyors and during processing on machines such as gluers, packaging machines, and those used in print finishing in graphics end uses. Rub can also occur in print surface to print surface contact in conversion and distribution.

Rub resistance is important in some end uses where printed and varnished surfaces may experience contact with water or condensed moisture, such as frozen and chilled foods.

The presence of excessive anti-set-off spray may also increase the danger of abrasive damage from rubbing. Achieving good rub resistance depends on the paperboard, the printing or varnishing process, and the formulation of the ink and varnish.

Cooperation is therefore essential between the manufacturer of the paperboard, the printer and the ink or varnish producer. Any special hazards of subsequent post-printing conversion and use must be understood and taken into account in the choice of paperboard, inks and varnishes, and printing process.

The paperboard features involved in achieving good rub resistance are connected to the smoothness, absorption and drying properties of the surface. The uniformity of all paperboard surface properties within orders of paperboard and consistency in these properties between one order and another of the same grade are an essential starting point. The printer should ensure that the print process and choice of inks will meet the rub resistance requirements of the subsequent conversion and use of the printed or varnished product.

Assessment of rub resistance
Poor rub resistance is apparent if, after normal handling and use, the printed or varnished paperboard surface is marked, scuffed or smudged.

An extremely demanding environment or special end use may require extra protection against rubbing. This protection might be provided by such treatments as extrusion coating or lamination.

Key properties
The following paperboard surface properties are involved in achieving good rub resistance:

- absorption and drying (oil-based inks)
- smoothness
- surface strength (oil-based inks)
- surface pH (oil-based inks).

It is important that the coating pigments are well bound within the coating so that they do not separate from the coating as a result of any mechanical influence such as rubbing. For the same reason the coating’s own strength and adhesion to the baseboard are also important to ensure that the entire coating does not loosen from the baseboard.

Measuring equipment
Laboratory rub testing of dry print can be done using an optional number of rubs and pressure. The results are assessed visually against standards.

A block is either moved back and forth over an area of printed sample or moved by rotary motion in an orbital path over the print depending on the instrument used. A record is made of the number of rubs e.g. 50 or 100 and weight e.g. 1 or 2 kg. The degree of surface rub is subjectively compared to reference standards.

The paperboard choice
The manner in which the paperboard is handled after printing and varnishing will dictate the importance of rub resistance in the choice of paperboard. Packing, distribution and handling by the consumer may also result in scuffing. Rub problems are prevented by using rub-resistant ink and varnish which is compatible with the absorption, setting, and drying properties of the paperboard. To increase rub resistance for special end use needs, the paperboard may need to be extrusion coated or laminated with plastic film.

Rub resistance characteristics
Rub resistance describes the ability of printed paperboard to withstand marking, scuffing or smudging during handling in conversion, packaging, distribution and use.