Cork *Tech Talk* News

Manufacturers of Waterbase, UV+EB Curable Coatings, Varnishes and Adhesives

2/94

STATE OF THE ART ABRASION TESTING

How do we best test to predetermine the durability of printed/ coated graphic arts products? We typically define durability by such terms as, scuff, wear, rub, smudge, abrasion, blotching and/or pick-off resistance. Historically a problem, defacing abrasion damage is even a greater issue today as International firms face the challenge of servicing global markets.

Through the years a variety of shaker boxes, tumblers and rub testers i.e., the Sutherland and the Taber Abraser, have been developed and used in order to simulate damage occurring in the field. While in wide spread use, most practitioners agree that all of these devices suffer from the inability to provide reproducible, repeatable results.

Consider the Sutherland, it's up and back motions simply do not reproduce the scuff markings and pick-off seen in field damage, and today's tougher finishes can produce rubs in the thousands with long test times. Further, test results are not able to be reliably reproduced between operators, laboratories and instruments.

The Taber Abraser too, with its rotating wheels and test bed does not reproduce the appearance of field found abrasion. Further, abrasive wheels that clog, lead to test repeatability difficulties and an inability to reliably correlate lab and field results.

The Comprehensive Abrasion Tester (CAT) (Gavarti Associates Ltd. of Milwaukee, WI.) was developed during the past decade to overcome these problems, and has evolved to become the test instrument of choice. The CAT, fast and easy to use, produces test results that are easily reproducible across different operators, instruments and laboratories. The CAT can reproduce or simulate the 5 most common types of field abrasion damage seen, which are: complete and partial image transfer, random image transfer, pick-off, and blotching. All types of flat printed and/or coated materials including paper, paper board, film, foil, and corrugated, can be tested for abrasion resistance or abrasiveness.

The CAT instrument combines the 4 factors found to contribute to abrasion damage when a product is handled and shipped. These are:

AMPLITUDE, defined as the movement in either direction that occurs when two surfaces are in contact.

FREQUENCY, defined as the speed at which the movement is occurring when two surfaces rub against one another.

PRESSURE, defined as the energy pressing surfaces together.

TIME, defined as the period surfaces are rubbing.

Fast and simple, the CAT test method consists of facing a test specimen against a receptor panel, both of which are then sandwiched between two protective foam sheets. This sandwich is then placed between two center spacer panel holders. Once mounted, pressure can be applied to the top and sides. Preset frequency, amplitude and time test conditions (default values) are then run, with the option of selecting a range of default values. During the test, the CAT's bottom carriage moves from left to right, cycling back and forth, setting up a rubbing motion as the tops of the spacer panels are held and pivot. Upon test completion, the test specimen is examined for wear and the receptor for deposition of ink or other transferred material.

The results can be rated to a comparative control or they can be quantified by making comparison to a ranking scale of 0 to 10 with 0 being the most abrasion resistant. Product to product test panels may also be tested, placing the test surfaces face to face for wet or dry testing.

Standard receptors are available that provide a range of abrasiveness, which when properly selected, reduce test time and eliminate frictional heat buildup. A ranking book containing comparative test specimens is also available.

The CAT has proven to be a reliable test procedure that has been able to replicate the actual abrasion damage resulting from handling, storage and shipping of various packaging and other printed materials.

The test method is also proving to be useful when comparing a variety of test parameters, under laboratory conditions. The CAT has been shown to be able to differentiate very fine degrees of rub. This produces the ability to quantify the abrasion differences between printed inks, varnishes, coatings, laminations and the surfaces of substrates, a value when seeking improvements.

Acceptance of the GA CAT by the printing industry has been accelerated by the adoption of a Standard Test Method by the ASTM (American Society for Testing and Materials) in 1991. See ASTM D 5181-91.

OVER

Cork Industries, Inc. 500 Kaiser Drive Folcroft, PA 19032 610.522.9550 F 610.522.9659
Elmer W. Griese, Jr. 440.353-0980 ewgriese.cork@att.net
Website http://www.corkindustries.com

Cork Tech Talk News

Manufacturers of Waterbase, UV+EB Curable Coatings, Varnishes and Adhesives

4/94

SOME FT. SOLUTIONS ATTACK AQUEOUS COATINGS

Alcohol substitute fountain solutions that use Butyl Cellosolve as a component should be avoided! The use of these fountain solution formulations has been found to retard the drying/curing of aqueous coatings, significantly softening the coating film. This raises the potential for blocking, rub and slip problems.

The past several years have seen a continuous effort on the part of fountain solution formulators to supply an effective product while eliminating the use of alcohol. This has resulted in innumerable 1 - step fountain solutions, so called alcohol substitutes being offered the printer.

The alcohol substitutes utilized are chosen because they are low VOC (volatile organic compounds) materials. By nature they are not as volatile (quick to evaporate) as alcohol. It follows that these slower evaporating materials do not readily volatilize in the press fountains, from the ink rollers or from the printed job. Roller train build up is something that requires watching because build up will cause ink and water balance problems.

Another problem that can develop when excess non-volatiles do not evaporate from the printed job is retarded ink drying. An ink film that remains soft may produce unwanted marking, offsetting, picking and blocking problems.

It is key that the printer recognizes that the minimum amount of alcohol substitute fountain solution (non-Butyl Cellosolve type) be run. High solid sheetfed inks formulated with the minimum total solvent content should also be used. This combination will raise the odds for the printed job to dry/cure effectively producing a desirable rub resistant surface.

The water and ink oil absorption rates of the paper, and or paperboard stocks being printed can also affect aqueous coating quality. If for example, the holdout of ink oils is high, then inks will tend to set very slowly under aqueous coating. Blocking, offsetting, and picking can result. If the holdout of water (fountain solution) is high, then fountain solution not absorbed by the paper, and or paperboard, will be held in the ink. This can produce an unwanted softening, (plasticizing) of the aqueous top coat as the ink film tries to dry over time.

In conclusion, successful printing and aqueous coating is the result of many variable elements being brought together correctly by the printer. Alcohol substitute fountain solution is one of these elements and it must be chosen with knowledge and great care.

LOOK TO CORK!....... for your coating and varnish needs, for both aqueous & UV/EB coatings/ and varnishes.

Cork Industries, Inc. 500 Kaiser Drive Folcroft, PA 19032 610.522.9550 F 610.522.9659
Elmer W. Griese, Jr. 440.353-0980 ewgriese.cork@att.net
Website http://www.corkindustries.com