

Cork Industries, Inc.

**Manufacturers of Waterbase, UV+EB Curable
Coatings, Varnishes and Adhesives for the Graphic
Arts Industries**

FLEXO

flexographic aqueous, uv & eb varnishes



AN INTRODUCTION:

Cork Industries, Inc. is the industry leader in the formulation of state-of-the-art coatings for the graphics arts industry. Incorporated in 1980 and located in Folcroft, PA., (Philadelphia), Cork remains a family owned and operated company. Throughout it's history, Cork has earned the reputation of providing innovative, novel solutions to challenging coating problems presented by the ever changing converting and printing industries.

Cork services a broad and diverse international graphic arts market consisting of printers and other converters, using both in-line and off-line application processes, coating a wide variety of substrates.

The low VOC aqueous product line offered, exhibits a wide range of properties providing functional coatings and primers, heat-seal adhesives, vehicles and extenders for liquid inks.

New in 1995, an expanding companion product line of low VOC, low draize, safe, high performance UV/EB coatings is finding broad market acceptance.

Committed to customer service, Cork is staffed to effectively partner with customers to provide satisfaction and exceed expectations. Continuous improvement linked to a quest for quality has resulted in a steady supply of reliable, consistent products.

Centralized manufacturing and research are located in Philadelphia, PA, with a supportive second manufacturing site in Jacksonville, FL. Product shipments are made from these and other strategically located warehouse centers.

Accomplished research and development, and technical field support capabilities are maintained, as is a technically oriented sales representative group.

LOOK TO CORK! positioned through experience, focused by commitment for the 21st century.



CONTACTS

Corporate/ Manufacturing

500 Kaiser Drive
Folcroft, PA 19032
p 610.522.9550
f 610.522.9659
e corkindustries@att.net

Manufacturing

5555 West Beaver Street
Jacksonville, FL 32254
p 904.695.2400
f 904.786.1001
e corkjax@aol.com

Technical Services

Tom DePrince

p 610.522.9550
f 610.522.9659
e corkindustries@att.net

Jim Sura

p 904.695.2400
f 904.786.1001
e corkjax@aol.com

North East Sales

Tony Alexander

p 508.429.8325
f 508.429.6685
e corkindustries@att.net

Mike Santone

p 610.649.1998
f 610.522.9659
e corkindustries@att.net

Norman Schmutter

p 201.833.2103
f 201.833.4715
e bsyd@bigfoot.com

Charlie Marczyk

p 610.431.1751
f 610.659.3337
e chasmarc@aol.com

South East Sales

Jeff Moore

p 904.695.0298
f 904.693.3656
e corkjam@bellsouth.net

James Reinhardt

p 919.870.8885
f 919.870.8084
e jrcork@aol.com

Midwest Sales

Richard Thomas

p 812.256.9087
f 812.256.9152
e g7glue@aol.com

Al Baracani

p 847.433.1278
f 847.433.5761
e avbisbum@earthlink.com

Raymond Siegel

p 708.449.6858
f 708.449.6973
e rsiegel723@aol.com

Mark Cupp

p 972.238.8615
f 972.238.8460
e markcupp@earthlink.com

Mike Daskavitz

p 330.966.6966
f 330.966.6967
e mdaskavitz@cs.com

West Coast Sales

David Ortega Sr.

p 626.915.3233
f 626.915.4544
t 6268256834@airtouch.net
e corkindustries@att.net

Brian K. Lewis

p 360.561.8906
f 360.705.2735
t 3605618906@mobile.att.net
e jnblewis@earthlink.com

Marketing Manager

Elmer Griese Jr.

p 440.353.0980
f 440.353.0980
e ewgriese.cork@att.net

National Sales Manager

Frank Higgins

p 610.522.9550
f 610.522.9659
e corkindustries@att.net

International Sales Manager

Mike McDonnell

p 610.522.9550
f 610.522.9659
e corkindustries@att.net

West Coast Technical Service

Doug Aasen

p 503.251.8308
f 503.251.8308
t 5037814687@mobile.att.net
e cndaasen@earthlink.com



FLEXO PRINTING

MARKETS

- *FOLDING CARTON*
- *LABEL*
- *BEVERAGE CARRIERS*
- *PAPER PLATES & CUPS*
- *PRE-PRINT LINER*
- *FLEXIBLE PACKAGING*
- *MULTI-WALL BAG*
- *BLISTER & FOLDOVER CARD PACKAGING*

SUBSTRATE

- *PAPER & PAPERBOARD*
- *METALLIZED PAPER & PAPERBOARD & FILMS*
- *VINYL*
- *POLYSTYRENES*
- *POLYESTERS*
- *POLYETHYLENES*
- *FOIL*

TYPES

- *AQUEOUS COATINGS*
- *AQUEOUS ADHESIVES (HEAT SEAL)*
- *UV COATINGS (FREE RADICAL)*
- *UV COATINGS (CATIONIC)*
- *EB COATINGS*



RECOMMENDED CORK-KOTE AQUEOUS COATINGS

<u>PAPER</u>	<u>FLEXO/GRAVURE</u>
HIGH GLOSS	CK-49G
GLOSS/RUB	CK-47
RUB/GLOSS	CK-26
SATIN	CK-72 SATIN
ALKALI RESISTANT	CK-735
METALLIZED PAPER	CK-30
HIGH GLOSS/CLEAR	CK-30
<u>MULTIWALL BAGS</u>	
GLOSS/HIGH SLIDE ANGLE	CK-8138
<u>LABEL AND TAG</u>	
GLOSS/RUB	CK-47
RUB/GLOSS	CK-26
HEAT RESISTANCE	CK-64M
FOIL/METALIZED PAPER/FILM	CK-30
OPP/LDPE FILM	CK-33F-11
<u>PAPER PLATES</u>	CK-7746
<u>PREPRINT LINER</u>	
HIGH SLIDE	CK-62
MEDIUM SLIDE	CK-64M
LOW SLIDE	CK-22W
<u>FOLDING CARTON</u>	
HIGH GLOSS	CK-49G
GLOSS/RUB	CK-47
RUB/GLOSS	CK-26
SATIN	CK-72 SATIN
ALKALI RESISTANCE	CK-735
WATER RESISTANCE	CK-71-93-12
HEAT RESISTANCE	CK-63M
BLOCK RESISTANCE	CK-26
NON SKID	CK-26 (16-20)
	CK-83JV2 (28-31)



Cork Kote WATERBASE FLEXO/GRAVURE COATINGS GUIDE

IN MOLD LABEL

PAPER

	<u>FLEXO/GRAVURE</u>
GLOSS/RUB	CK-695
HIGH GLOSS	CK-47; CK-26
SATIN	CK-72 SATIN
ALKALI RESISTANT	CK-1673
METALLIZED PAPER	
HIGH GLOSS/CLEAR	CK-30
PLASTIC	
GLOSS/RUB	CK-3335
SATIN	CK-72 SATIN
PRIMER-UV	

RECOMMENDED CORK-KOTE HEAT ACTIVATED ADHESIVE

PAPER & PLASTICS

ADHESIVE	CK-55
----------	-------



Cork Kure **UV+EB FLEXO/GRAVURE COATINGS PRODUCT GUIDE**

RECOMMENDED CORK-KURE UV COATINGS

	<u>PRODUCT</u>	<u>CPS VISCOSITY</u>	<u>ZAHN VISCOSITY</u>
HIGH GLOSS	CU-1041 HG	60 - 75	21 - 23#2Z
	CU-1150 HG	170 - 230	22 - 26#3Z
	CU-1086 HG-1	180 - 250	22 - 27#3Z
	CU-1071 HG	240 - 285	25 - 29#3Z
	CU-1057 HG	160 - 190	18 - 22#3Z
	CU-1093 RHG	260 - 290	29 - 31#3Z
	CU-1121 HG	200 - 280	22 - 26#3Z
	STAMPABLE HIGH GLOSS	CU-2037 HG-2	125 - 170
CU-2076 HG		255 - 315	27 - 33#3Z
SEMI-GLOSS	CU-508 SG	75 - 145	17 - 23#3Z
MATTE	CU-051 MG-5		20 - 28#3Z
STAMPABLE MATTE	CU-061 MG		20 - 26#3Z

RECOMMENDED CORK-KURE ULTRAVIOLET COATINGS

IN MOLD LABEL

HI-RUB/GLOSS CU-1057

RECOMMENDED CORK-KURE EB COATINGS

IN MOLD LABEL

PAPER/FILM E-1112-HG2
SEMI-GLOSS E-506-SG
MATTE E-048-MG-1



TECHNICAL DATA SHEET

CORK-KURE CU-1057-HG

PRODUCT DESCRIPTION

-CORK-KURE CU-1057-HG is a high gloss, solventless, acrylic epoxy based, 100% reactive UV curable coating. It is formulated to produce a low slide angle. This product features excellent abrasion resistance, flexibility, and good flow.

PHYSICAL PROPERTIES

VISCOSITY:	180 - 210 cps @ 77F LVF#2 @ 60 RPM 22 - 24 seconds, # 3 Zahn cup @ 77F
% NON VOLATILE:	100
LBS./GAL:	9.0
APPLICATION WEIGHT:	1.0 LBS./MSF
CURE RATE:	100 FPM
GLOSS @ 60 ANGLE:	80+
SLIP:	9 - 10 degrees slide angle
ABRASION RESISTANCE:	>200 cycles 4# wt., Sutherland

PROCESSING INFORMATION

Clean equipment with MEK, MIBK, or Toluol.

Equipment should be cleaned after each use. Contact with copper alloys must be avoided. Keep UV sources away from material. Coating must be tested and matched to the inks and substrates to be used. For best adhesion and flow, inks should be free of waxes, silicones, and any other anti-scuff additives.

To obtain best shelf life, do not store product above 100F. Avoid storage periods exceeding 3 months. Stir before each use. Avoid contact with the skin. Proper ventilation is required. Dispose of any spills and cleaning materials in accordance with local, state, and Federal regulations.

SHIPPING INFORMATION

UV curable coatings are shipped in 250-gallon totes, 55 gallon lined drums filled to 50 gallons and 5 gallon lined pails filled to 4 gallons.



FLEXOGRAPHIC PRINTING

Those of you that know flexo, know that it is a printing process that has undergone phenomenal change. Furthermore, flexo while fundamentally remaining the same, a fluid or liquid ink process, continues to evolve for the better. Innovation has produced amazing advances in rollers, anilox rolls, plates, inks, presses, pre-press, and substrates.

Flexo is a rotary printing method that utilizes resilient raised image plates of rubber or more recently, photopolymer materials that offer the process vast improvement. Printing and coating (varnishing) is accomplished using a “kiss” impression with the raised image plate impacting directly onto the substrate. Inks and varnishes may be solvent or water based or UV curable. Whichever they are, they are dried between the print stations (decks) of a press.

Flexo printing is a web process with three types of presses in widespread use. These are the stack, CI (central impression cylinder, and in-line designs. In a stack press, print decks are stacked one over another. The CI press features a single steel central drum around which are located multiple 4, 6, and 8 or more color print decks. The CI cylinder carries the web in tight register past all of the print stations. The CI press offers the advantage of controlling stretchable substrates very well. Stack and CI presses print and varnish in a wet printing process where successive colors are more or less wet trapped because small inter-color dryers can't completely dry conventional inks in the space and time allowed. The third type of press design is the in-line which features separate print stations that are mounted horizontally one after another with almost any number of color print stations possible. Advantages to in-line presses are the ability to dry trap as a result of drying completely between print units and better color to color register. In-line presses are commonly used by printers of folding cartons, corrugated and multi-wall bags. They have found a home in the ever expanding narrow-web label market.

In flexo printing an ink-fountain pan supplies ink, or varnish to a rubber fountain roll which in turn transfers to an (anilox) metering roll to which is mounted a reverse angle doctor blade. The blade shears the fluid ink, or varnish from the surface of the anilox roll leaving a precise quantity available in engraved cells for transfer to the printing plate. Cylindrically mounted image plates transfer inks or varnish to the substrate being printed.

Considering anilox rolls, mechanically or laser engraved cells deliver a measured quantity of ink or varnish to the plate. The amount is metered by the number and depth of the cells. The higher the screen count, the smaller the cells, i.e., a 400 line screen anilox contains 400 cells per lineal inch or 400x400 or 160,000 cells per square inch. The lower the screen count the larger and deeper the engraved cells are.

FLEXO MARKETS

Flexo, is one of the fastest growing printing processes, with growth exceeding 8% per year. Historically known as a crude printing process, technological advancements have made flexo a quality print process to be considered. Flexo now competes directly with gravure and offset, producing print quality equal to and sometimes better than either.

Flexo markets are:

- *Corrugated, post and pre-print*
- *Flexible packaging films*
- *Laminated pouches*
- *Bags*
- *Multiwall bags*
- *Single service cups and containers*
- *Labels and tags*
- *Gift wrap*
- *Milk and beverage cartons*
- *Folding cartons*
- *Envelopes*
- *News print*



FLEXOGRAPHIC PRINTING

FLEXO ADVANTAGES

- *substrate variety from absorbent to nonabsorbent*
- *fast drying solvent, aqueous or UV inks and varnishes*
- *continuous pattern print capability*
- *fast line speeds 2,000 FPM +*
- *variable repeat length system*
- *long life plates print millions of impressions*
- *dry trap printing process*
- *adapts well to in-line coating and laminating operations*
- *short run or long run functionality*
- *both front and reverse side print/coat possibilities*
- *precise, measured, controlled inking/ coating process*
- *high quality 800-900 LPI printing*

UV FLEXO ADVANTAGES

- *instant dry*
- *reduced waste-especially in startups*
- *better color control*
- *reduced downtime and easier cleanup*
- *great run to run repeatability*
- *inks stay open on press until cured*
- *solventless, low or zero VOC*
- *no solvents added pressside*
- *improved adhesion to films*
- *better chemical/product resistance*

UV FLEXO

The development and application of UV to flexo is a recent achievement. It can be said that UV has been the driving force responsible behind the explosive growth of the narrow-web flexo market. The benefits are obvious and are as listed above. The ink stability factor and the small dot gain have helped bring flexo up to the quality of gravure and offset. The continued evolution of improved anilox rolls, plates, inks, varnishes and prepress additionally add to improved quality.

UV technology has been mainly applied to narrow-web presses, but now even the wide web press manufacturers and markets are looking to UV for its benefits. Narrow-web in-line presses, which are under 24" wide, are known for their ability to do multiple in-line converting operations, such as varnishing, die cutting, etc. The narrow-web market has been predominately pressure sensitive labels, but now other markets such as packaging, can and beverage wrap, and in-mold label are growing. The wide-web market which has traditionally produced flexible packaging is now expanding into folding carton, long run labels and pre-print linerboard for corrugated. Seemingly all of the markets are currently crossing over both the narrow-web and the wide-web equipment platforms.

DRYING

Conventional ink and varnish drying is done using impinged air, with or without IR. In-line presses feature a dryer after each print unit allowing dry trapping. Heating elements or gas is used to supply hot air. UV equipped presses will feature a dryer after each print unit also allowing dry trapping of inks and varnish. CI presses as discussed earlier, wet trap conventional inks as a result of limited inter-color drying capacity. Electron beam (EB) is another curing process that may well be adopted in the future to instantly cure and polymerize 100% solids inks and varnishes.

FILM SUBSTRATES

A current trend is the shift away from paper to a variety of film substrates. Plastic films have always played a role in the traditional products decorated by flexo. However, since the beginning of this decade not only have a greater variety of products been converted to film but also to lighter gauge films. The use of these materials has lead to the necessity of producing a different kind of press; one that can control light films physically while insuring that web temperature does not become so high as to be detrimental. A major press feature is now a temperature controlling chill drum. Heat build-up on central impression cylinder presses is of special concern but the problem is being addressed related to both UV and more conventional IR drying.



FLEXOGRAPHIC PRINTING

An ever-changing variety of plastic film types based on polyethylene, polypropylene, nylon and polyester resins have been made available. In addition metallized and now glass-coated versions are in use. Of concern to the printer is the printability of these substrates related to their surface tension and wettability for acceptable adhesion.

PLATES

The high level of print quality now being achieved by flexo printing would not have been possible except for the development of the photopolymer plate. This single development has allowed the production of fine, very detailed flexo print images. Photopolymer plate technology has advanced to where plates are thinner and are capable of very accurately reproducing fine line type, screened tones, and produce true process printing. In plate making, photopolymers wash out using water after exposure to UV light. The latest flexo plate developments mimic those common to gravure and offset in consideration of a photocomposed wraparound plate with images step-and-repeat positioned for very tight register. This pin-registered wrap around plates will eliminate the need for a mounter-proofer and speed job startup.

Electronic prepress is also impacting on the production of flexo plates right on the heels of gravure and offset printing. FM or frequency modulation is another graphics advancement that is being used to help produce higher quality, finer detailed printing. This process enables the printing of uniform, single sized, smaller dots, in random order, which eliminates a set structure, and angle for the dot produced image. When the density of the image changes the quantity of dots utilized changes. Photopolymer pattern plates and matrix boards are leading to the production of very detailed rubber plates that rival photopolymer plates. These are finding application in packaging where low duplication costs, excellent handling properties, and great solvent resistances are attractive. Pin registration systems are multiplying as fast as the demand for higher quality printing mounts.

ANILOX

The control of ink or varnish volume has evolved with the development of a series of improvements to anilox production. These have moved from machined steel, to chrome, to ceramic coated, to chemically etched, to laser engraved ceramics. Cells can be effectively produced engraving mechanically, electronically, or with laser. Self-cleaning cell configurations and durable surface coatings are important. Quality of image reproduction has placed an ever-increasing demand on anilox fineness. Line counts of only 350-450 lines per lineal inch were common only a few years ago. Currently, line counts are seen reaching 800LPI and even 900 LPI. A laser engraved ceramic roll of 800 LPI allows a shallow etch, lower volume, hexagon cell configuration to carry less ink to produce a thinner ink film and thereby higher quality dot image production. Today the talk is about optimization of cell geometry, volume and ink film with regard to the demand for higher quality print graphics. The latest breakthrough is the ability to certify cell volume by a computer-controlled scan.

CLOSED INK SYSTEM

Chambered type closed inking systems are becoming commonplace. These distribution designs with a reverse angle doctor blade allow ink or varnish to be pumped into an enclosed chamber which allows the cells of an anilox to be precisely refilled with each revolution. High speed, high quality printing demands that a precise volume of ink be transferred from the anilox roll to the printing plate consistently at all operating speeds.

Advantages are:

- *variable speed running with minimum adjustments*
- *minimized anilox cell cavitation due to surrounding air*
- *control of slinging or splashing*
- *ghosting reduction/elimination*



FLEXOGRAPHIC PRINTING

VARNISHES

Varnishes are applied in the last unit over inks to provide ink protection and render a clear, glossy look. Application is achieved using an anilox roll usually with a quad or trihelical engraving to apply an adequate coat weight, which may be easily spot located. Aqueous varnishes, low in VOC are popular as are UV varnishes. Both products cure or dry rather instantly, allowing further in-line, high productivity, converting. In-line one pass converting is the word. The finished properties of varnishes can be varied to produce matte, satin, and gloss finishes, low slip to non-skid, acceptability for gluing, stamping and imprinting, resistance to water, grease, alcohol, alkali, ammonia, high heat, and a variety of chemicals and packaged products. Further, both UV and aqueous varnishes may be low odor, recyclable and repulpable. Specific, aqueous varnishes are offered that are FDA conforming for direct food contact.

PREPRINT LINERBOARD

Preprinted linerboard became a factor a full decade ago as multi-color five and six-color wide web flexo (CI) and stack presses were installed to provide mass merchandising graphics for corrugated packaging. The market for preprint continues to grow and with this opportunity new six-color plus varnishing presses featuring short and long run capability, with automatic registration, and quick changeover will appear. Drying capabilities are being increased using IR dryers as well as considerations for using both UV and EB technology. Results will soon be seen in higher press speeds and more marketable higher gloss graphics on more difficult porous substrates.

TOMORROWS DEVELOPMENTS

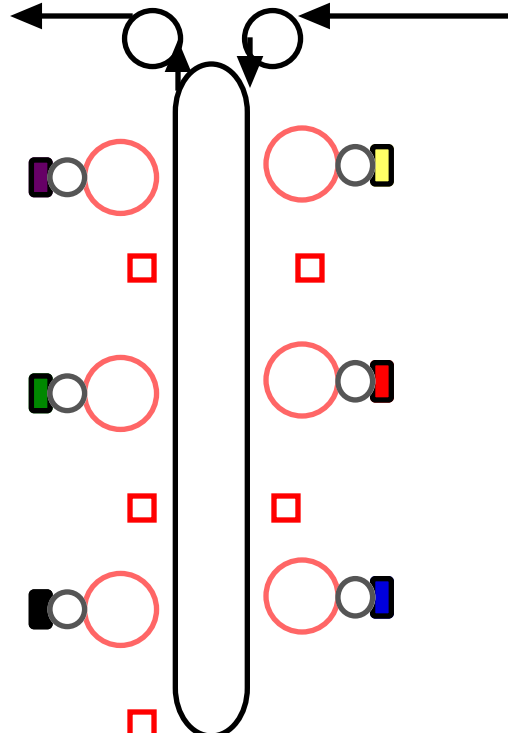
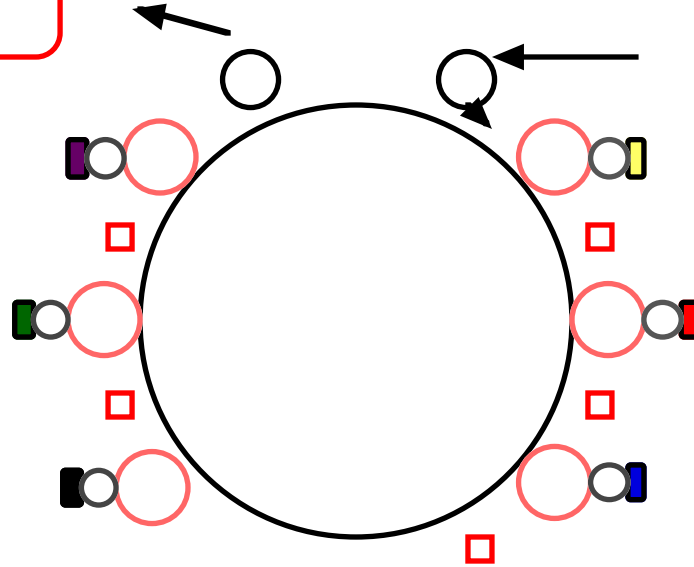
Predictions made for the future of flexo indicate that there will be many changes but we've seen some of this direction already. The environment commands the future. Costs and pollution problems, some of what we've been exposed to already will demand these changes. Laws will continue to be made that will ban any packaging materials that are not biodegradable. We're seeing already that it's not practical to attempt to separate plastic films and other plastic packaging for recycling.

The materials that will be allowed must be materials that will biodegrade and naturally decompose from exposure to moisture, light, UV and the resultant bacterial and elemental action. One problem is that these new substrates will not have the physical properties nor will they be as cost effective as currently used nondegradable plastic resins are. Aluminum foil also poses a problem with regard to disposability. It is forecast that metallized plastic and cellulose substrates will become replacements. Polyethylene will have to be replaced by biodegradable substrates and because its' function in heat sealing will be lost, coatings will come into greater use. Topcoats will provide gloss and print protection while backside coatings will provide sealing and barrier capabilities. Aqueous cold sealing backside adhesives will grow in use because packaging line seals can be made faster than, when heat sealing. The use of functional coatings will grow sharply as they are used as replacements for the properties of films that are outlawed. Water coatings and adhesives are forecast to have dominance in the printing and converting industries by the turn of the new century. Aqueous inks will continue to replace solvent inks because of environmental requirements and because they are cheaper. UV and EB inks, coatings and adhesives will also grow in use. Laminating of substrates will most likely continue to grow as the search for package physical properties that equal that of outlawed substrates is intensified. Here to the development of 100% solid UV and EBcuring adhesives will replace 100% solid "moisture cure" isocyanate based laminating adhesives because of the forecast worldwide banning of isocyanates.

The 1990's are an exciting time for flexo as the printing process evolves fully into a print process that competes well with all other print alternatives. Flexo will grow as it expands in present markets and captures an increasing share of market from other print processes. Coatings and varnishes will be an important part of the process as substrates change to better protect the environment. Flexo, as we've reviewed, utilizing recent technological advancements, is able to produce the highest quality in print graphics enabling it to be a quality competitive print process on the move.

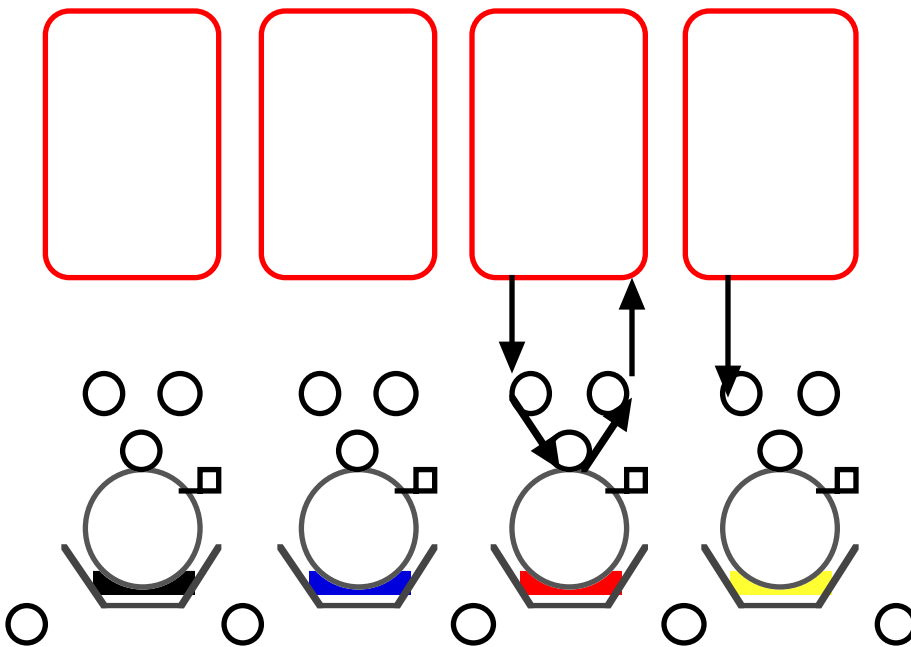
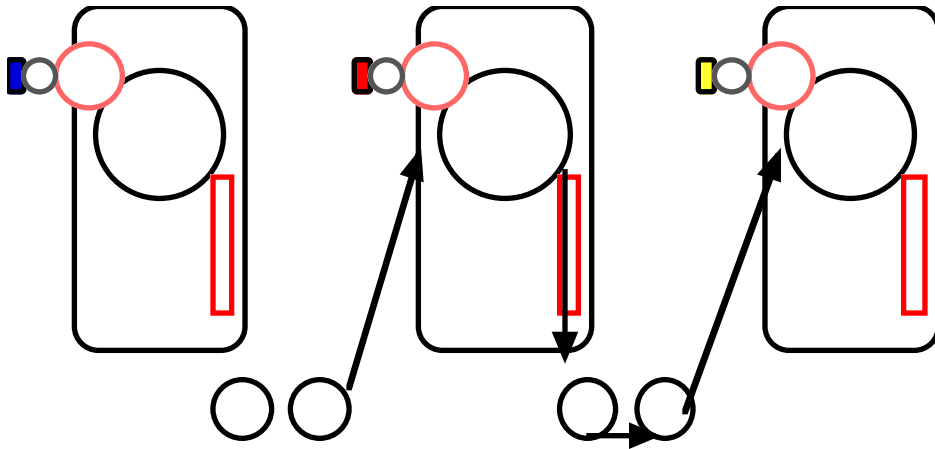


FLEXOGRAPHIC EQUIPMENT



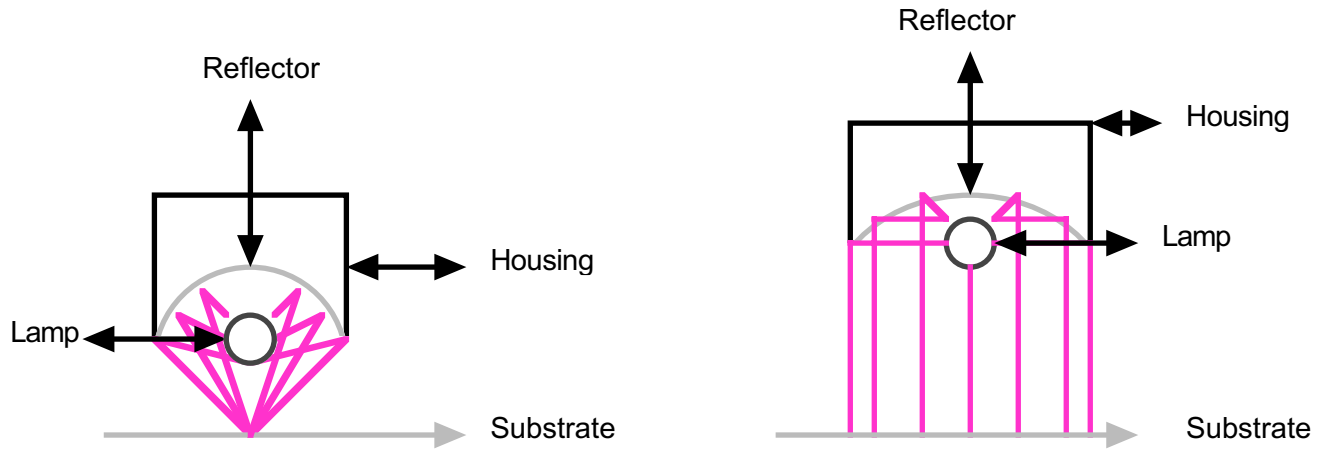


FLEXOGRAPHIC / GRAVURE EQUIPMENT



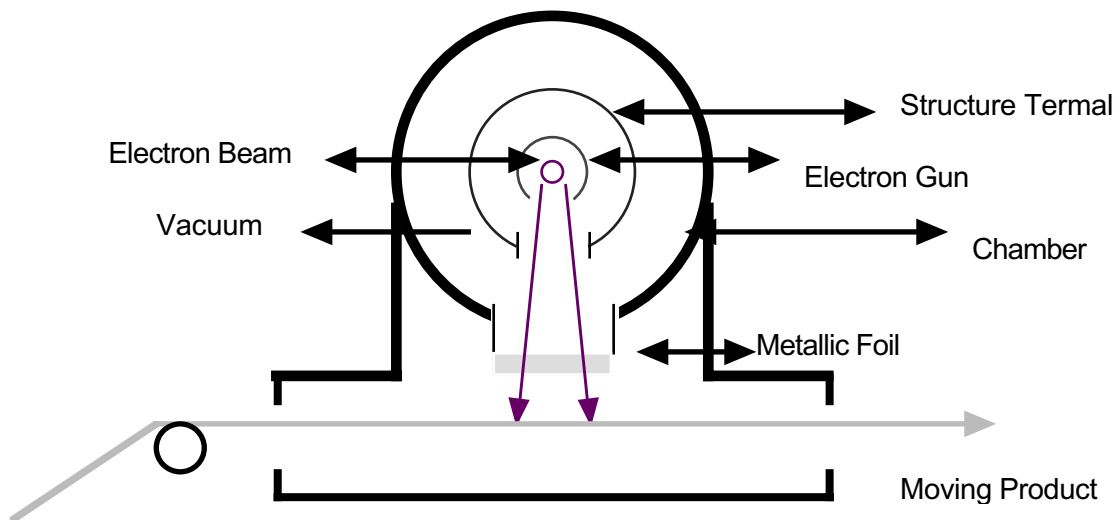


CURING EQUIPMENT FOR UV+EB COATINGS



Elliptical

Parabolic





GLOSSARY

ABRASION RESISTANCE - Resisting rub/scuff/scratch or the ability to limit damage from rubbing against another surface.

ABRASION TESTS - Tests designed to gauge abrasion resistance, e.g., Sutherland, Taber Abraser, and the GA-C.A.T.

ABSORBENCY - Capable of absorbing, e.g. water into paper.

ACID - A chemical substance, when in solution with water forms hydrogen (H) ions. Acids taste sour, and are corrosive. (see pH).

ACRYLATE - Chemical compounds containing a carbon-carbon double bond next to an ester carbonyl. Radiation cure monomer.

ACRYLIC - Transparent, thermoplastic polymeric resins based on acrylic acid or derivatives.

ACTINIC RADIATION - Electromagnetic radiation sufficient to produce photochemical action but unable to produce ions, usually having a wavelength more than 185 nanometers.

ADHESION - The force or strength that sticks two surfaces together when they are in contact.

ADHESIVE - Material used to bond two substrates together.

AGERESISTANCE - Shelf life. The resistance to deterioration by environmental factors such as; air borne ozone and oxygen, heat and light or by breakdowns internally.

AIR ENTRAPMENT - Air bubbles mixed into a liquid or paste.

AIR KNIFE COATING - Coating applied by a flat jet of air.

ALCOHOL - A group of organic colorless, volatile solvents that contain hydroxyl groups (OH).

ALKALI - A chemical base, generally soluble in water, capable of neutralizing acids. (see pH).

ALLIGATORING - The cracking of a coating film into large segments which look like the hide of an alligator. (see crazing)

AMBIENT CONDITIONS - A term used to describe the temperature, humidity and other conditions of the surrounding air.

ANCHOR COATING - Primer applied to a substrate to increase the adhesion of subsequent over-coatings; also called a tie-coat.

ANHYDROUS - Free from or containing no water.

ANILOX ROLL - A mechanically, chemically, or laser engraved chromed metal or ceramic metering roll used to control the application of liquid inks, coatings and adhesives.

ANTI-FOAMING AGENT - Additive that breaks foaming bubbles.

ANTI-SKID - Describes increasing friction and preventing slip.

APPLICATOR ROLL - Roller that applies and meters a coating.

AROMATIC HYDROCARBONS-SOLVENTS - Volatile organic solvents, e.g., toluol and xylol common in solvent liquid ink/varnish.

ASTM - The American Society for Testing Materials.

BACKUP ROLL - Refer to impression cylinder.

BAG - A preformed flexible package with an opening for filling at one end. May be multi-wall with a variety of bottom seal designs.

BAKE - A process of drying/curing by the application of heat/time.

BARRIER - Protection, such as a coating limiting transmission of moisture, WVTR, gas or grease, etc. through a substrate.

BASE COAT - First down holdout or filler coating.

BATCH - The quantity of materials prepared at one time.

BINDER - The adhesive component of a coating or an ink (resin vehicle). Also, in paper, the adhesive component used to cement inert clay fillers to the substrate surface.

BLANKET - The material sheet mounted to the offset cylinder to receive ink or coating and offset it to a substrate.

BLEED - Certain pigments give up color when in contact with water causing the pigmented article to lose permanence. Also a print of color that extends to one or more edges of a page.

BLISTER - A bubble or small raised area, usually caused by the expansion of trapped gas or liquid.

BLISTER PACKAGING - A type of packaging where a thermoformed plastic container or cell is heat sealed to a usually printed paperboard package component.

BLOCKING - Adhesion or sticking of two or more layers of material in sheet, roll or package form that causes undesirable damage when the surfaces are separated. Usually aggravated by heat, pressure and humidity.

BLOCK TEST - Tests designed to measure and determine the conditions under which blocking or sticking of materials will occur.

BLOOM - Migration to the surface of a material or an ingredient such as a plasticizer rising to the surface of a plastic substrate.

BLUSHING - Manifested as a milky, whitish appearance in a coating, ink or an adhesive which is usually caused by excessive moisture condensate or may also be caused by the precipitation or incompatibility of a raw material ingredient.

BOARD - Generally a construction of paper fibers but may also be of other fibers, usually defined as over .006" or thicker.

BODY - Consistency, flow and viscosity of a paste printing ink.

BRIGHTNESS - Descriptive of paper and paperboard and the quality of whiteness intensity reflected from the substrate surface.

BROKE - Paper material spoiled in converting that is reprocessed in mill processes to produce usable stock.

BRONZING - Applying bronze powder to wet sizing ink.

BROWN KRAFT - Natural or brown unbleached kraft paper.

BUBBLE BREAKER - Additive used to breakdown foam.

BURSTING STRENGTH - The measure of a substrates resistance to rupture. Measured in P.S.I. using a Mullen tester.



GLOSSARY

CALENDERING - A machining technique used by the paper, plastic, and finishing industries, where substrate is run between a series of rollers or belts to impart a smooth, flat or glossy finish.

CALIPER - Thickness of paper or paperboard expressed in mils.

CAST COATING - A paper coating technique where a coated paper web is pressured against a smooth, highly polished, chrome drum surface while the coating is soft or plastic. The cured coating takes on the finish of the contact drum.

CATALYST - Any material used to aid the completion of a chemical reaction without becoming part of the product.

CATIONIC CURE - Polymerization initiated by an energized molecule reacting with cationically sensitive monomers.

CATHODE - Negative charged filament emitter in a vacuum tube.

CAUSTIC - Very high pH alkaline materials that are corrosive.

CELL - In roto-gravure printing a gravure cylinder whose surface consists of many small engraved wells that pick up a volume of ink or coating for deposition to a substrate.

CENTIPOISE - A unit of measure of viscosity. For reference the viscosity of water at 20 C is almost 1 centipoise.

CHALKING - A powdery surface appearance that can be wiped off, seen at times when an ink pigment is not fixed to a substrate.

CHECKING - Fine, shallow coating surface cracks, (see crazing).

CHEMICAL RESISTANCE - The prevention or retarding of attack by various chemicals.

CHILL ROLL - A metal roller cooled usually with water and used after a dryer to cool a printed or coated web of substrate before further processing or rewinding. Also sets heat set offset inks.

CHIPBOARD - Uncoated, low density, reclaimed fiber box board.

CLARITY - Clear and transparent, without haze.

CLAY COATING - A clay, pigment, binder composition coated to paper and paper board to improve whiteness, smoothness and imprintability.

C1S is coated one side and C2S coated two sides.

CLING - The attraction of two surfaces to adhere to each other, similar to blocking, but with no visible damage when separated.

COALESCE - Unite or merge into a single body or mass.

COATING - A liquid substance applied using a coater, dried and adhered to a substrate surface.

COATING WEIGHT - Amount of coating applied to a substrate.

COEFFICIENT OF FRICTION - A measure of surface slip between two objects. (KINETIC COF) is the friction between two surfaces when there is movement. (STATIC COF) is the force needed to overcome the adhesion between two surfaces at rest to allow free movement.

CO-EXTRUSIONS - Multi-layer films produced by the multiple simultaneous extrusion of plastic materials.

COHESION - Internal strength of a material that holds it together.

COMPATIBILITY - The ability of two or more differing substances to function together acceptably.

COMPOUND - Chemical combination of elements which lose their characteristics forming a new substance with new characteristics.

CONJUNCTIVITIS - Painful inflammation of the mucous membrane of the inner eyelid and eyeball covering which can be caused by excessive UV light, and/or sunburn exposure.

CONSISTENCY - Used to describe the rheological properties of a liquid, such as the viscosity or flow.

CONTAMINATION - The presence of foreign material.

CORONA TREATING - An electrical discharge used to treat (oxidize) a surface to produce a wettable and printable surface. Raises the surface tension of a plastic films surface.

CO-SOLVENT - One of two or more solvents in a mixture.

CRATERING - A volcano crater like printing/coating defect.

CRAWLING - Poor ink/ coating lay due to poor substrate wetting causing a contracting into droplets and a discontinuous film.

CRAZING - Very fine cracks in a coating surface (see checking).

CROSS DIRECTION - The direction at right angles to the machine direction of a web passing through a machine.

CROSSLINKING AGENT - Reactive chemical which will cause strengthening bonds to form between other molecules.

CROWN - The difference in diameter between the center of a roller and the diameter at the ends.

CURE - The converting of a wet coating or ink to a solid film.

CURL - When paper wants to coil or roll at the edges.

CYLINDERS - Rotary offset presses have three cylinders, plate, blanket and impression cylinders.

CYLINDER BOARD - Cylinder machine made with in-line grain.

DAMPENER - In litho the roller unit that distributes dampening/ fountain solution to the press plate.

DEFOAMER - An additive that reduces or prevents foaming.

DEGREE OF CURE - Extent to which UV/EB functional chemicals have been reacted. Usually inversely related to free monomer level.

DELAMINATION - Separation of the layers of a laminate.

DERMATITIS - Inflammation of the skin, itching, redness, lesions.

DILATANCY - Viscosity increasing with increasing shear rates.

DILUENT - A thinning fluid, not necessarily a solvent.

DISPERSION - Fine particles of a solid material in suspension in another substance.



GLOSSARY

DOCTOR BLADE - A blade that scrapes excess ink or varnish from the surface of an etched cylinder leaving cells filled.

DOCTOR ROLL - In flexo, the fountain roller.

DOSE, RADIATION - Quantity of ionizing radiation absorbed per unit of mass. Defines EB cure dose ranging from 1-10 megarad.

DOSE RATE - Dose of energy per unit of time, e.g., Mrads/sec.

DRAIZE TEST - Refers to rabbit test method for estimating skin and eye irritation caused by chemical substance exposure.

DRAWDOWN - A thin film of ink pulled down on a substrate using a smooth bar or a thin film of coating drawn down using a meyer rod or other metering device for evaluation purposes.

DRIER - Metallic substances added to inks as accelerants to speed drying by oxidation and polymerization of ink oil vehicles.

DRY BACK - A change in color or finish of an ink as or after it dries or the lose of a coatings gloss some time after drying.

DRYER - An apparatus supplying energy of some sort to speed the drying of inks and coatings.

DUCTOR ROLLER - An intermittent contact roller that contacts the fountain roller and transfers ink to the presses distribution system, also the roller that transfers fountain solution to the dampening rollers in litho.

DULL FINISH - Matte or satin surface lacking luster, or gloss.

DWELL - In heat sealing, the time under heat and pressure.

EDEMA - A condition when abnormal amounts of fluid are contained by body cells, serous cavities or tissues.

ELECTROMAGNETIC SPECTRUM - Refers to the complete range of frequencies of electromagnetic waves from the longest to the shortest, including in order, radio, infrared, visible light, ultraviolet, X-ray, and gamma rays.

ELECTRON ACCELERATORS - Electrical devices utilizing very high voltages to accelerate electrons.

ELECTRON BEAM - Device that generates a stream of electrons to cure (turn wet UV/EB inks and coatings to solids).

ELECTRON CURTAIN - Device that generates a wall of electrons from a linear cathode instead of in a point or beam.

ELECTRON VOLT - Unit of energy equal to 23.06 Kilocalories/ mole or 1.6 x 10⁻¹⁹ joules. In UV a 4-5 ev protons energy can break certain chemical bonds. In EB electrons are accelerated to thousands (keV) or millions (MeV) of electron volts, i.e., eV is a measure of an electrons capacity to penetrate matter.

ELLIPTICAL REFLECTOR - Polished, concave surface focused to direct optimum UV energy to a curing zone.

EMULSIFICATION - In litho printing when excessive fountain solution is mixed with ink.

EMULSION - The result of emulsification which disperses one immiscible (un-mixable) liquid in another.

EPA - Environmental Protection Agency of the U.S. Government charged with implementing the Clean Air Act, the Clean Water Act, Resource Conservation and Recovery Act, and the Toxic Substances Control Act.

EPOXY - Chemical substances containing an oxirane ring.

ERYTHEMA - Any redness of the skin, like sunburn.

EVAPORATION - The changing of a liquid or solid into vapor.

EXTENDER - A colorless or white material added to inks or coatings to reduce cost without harming properties.

EXTRUSION COATING - A process wherein a plastic resin is hot coated onto a substrate by melting and forcing the material through a thin film shaping die.

EXUDATION - Migration to the surface of a coating or film ingredient.

FAST SOLVENT - A low boiling point, fast evaporating solvent.

FELT SIDE - The top side of paper or paper board that is opposite the wire side during mill manufacture.

FIBER TEAR - Describing the internal tear or separation of paper fiber within a paper or paper board fabrication.

FILM - A fine, thin skin, layer or coating. Also describes unsupported, non-fibrous thin flexible material, usually plastic extruded, cast or calendered up to 10 mils thickness, .010.

FILM BADGE - Monitoring device containing a radiation sensitive film used to measure a persons radiation exposure level.

FILM FORMER - Resins used in ink and coating formulation capable of forming a continuous film after drying.

FILM GAUGE - A measurement of the thickness of a film, i.e. 50 gauge is 0.5 mil thickness.

FINGERNAIL TEST - Coating surface hardness test using a fingernails scraping action. Also used is the pencil hardness test.

FISH EYES - Translucent spots or defects in a film or coating that resemble fish eyes and are caused by extraneous material.

FLAMMABILITY CLASSIFICATION - Classification of liquids by flash point and boiling point into six groupings for fire safety.

FLAMMABLE - Materials that will burn or support combustion.

FLASH POINT - The lowest temperature at which a volatile solid or the vapor of a liquid will flash when exposed to a flame.

FLEXOGRAPHY - A typographic liquid ink printing method using flexible raised printing plates and variable repeat plate cylinders inked by doctor blade wiped engraved metal or ceramic rollers.

FLOCCULATION - Describes the aggregation of pigment particles in an ink forming clusters or chains of color, usually resulting in a loss of strength or color shift.

FLOW - Leveling out property of an ink or coating. In paste inks short body equals poor flow and long body equals good flow.



GLOSSARY

FLYING (MISTING) - Refers to an unwanted fine mist or spray of ink thrown from ink rollers during printing.

FOAM - Mass of bubbles formed by agitation in or on liquids.

FOIL - Descriptive of thin mill rolled metals (less than 6 mils thickness, .006) e.g., aluminum foil.

FOIL WINDOW - Metallic foil in EB processor that passes electrons from vacuum chamber to ambient curing process area.

FORM - Type and other graphics in a form ready for printing.

FORM ROLLER - The roller in a printing press that makes direct contact with the printing plate and transfers ink to it.

FOUNTAIN - Reservoir for ink on a printing press. Also in litho the fountain solution reservoir.

FOUNTAIN SOLUTION - In litho the mixture that prevents the non-printing areas of the plate from receiving oil based ink.

FOURDRINIER - The inventors name applied to an entire modern paper making machine from wet end to dry end.

FREE RADICAL - An unstable and reactive material that initiates polymerization in UV curables, usually by the loss of an electron.

FREE RADICAL POLYMERIZATION - The chemical reaction process of producing a high molecular weight complex molecule from a number of simple molecules initiated by a free radical and propagated through carbon/ carbon double bonding.

FUGITIVE COLORS - Describes colored inks made from non- permanent pigments and/or dyes that can change color due to exposure to light, heat, moisture, etc.

FUNCTIONALITY - Refers to the number of groups on any one molecule which have reactivity potential.

FUNCTIONAL COATING - Coatings designed to provide a specific function, e.g., a barrier or a heat seal.

FURNISH - In paper making, the list of ingredients that make up a particular type of paper formulation.

GAS CHROMATOGRAPHY (G.C.) - An analytical test method used to determine the composition of volatiles and identify trace amounts present in other substances.

GHOSTING - Transfer of a faint design image from a print area to an unprinted area which can occur without actual ink transfer.

GLOSS - The reflection of light from a surface.

GLOSS METER - An instrument that measures the percent of specular (mirror) reflectivity from a surface at a particular angle.

GRAVURE - A printing process that uses the intaglio process where an engraved, micro-celled cylinder is used to pick up a volume of liquid ink, varnish or coating for transfer to a substrate.

GREASE RESISTANCE - The property of a material to resist penetration by greases and oils.

HAZE - Cloudiness in a normally clear material.

HEAT RESISTANCE - The property of a material to resist the effects of high temperature exposure.

HEAT-SEALING - A method of joining heat reactive materials using heat, pressure and dwell time.

HEAT-SET INKS - Web offset litho inks that dry when an oven evaporates high boiling solvent leaving solids to be set by chill roll.

HELIO-KLISCHOGRAPH - A method of engraving gravure cylinders with a diamond mechanical cutting head guided by an electronic scanner measuring the density of a positive copy.

HERMETIC - Airtight and liquid tight.

HICKIES - In printing, unwanted specks surrounded by an unprinted halo caused by foreign material displacing printing ink in the transferred image print area.

HMIS - Hazardous Materials ID System. Recommends safeguards and grades health, reactivity and flammability 0-4.

HOLD OUT - Substrate resistance to ink/coating penetration.

HOMOGENEOUS - Composed of similar or identical elements throughout, uniform.

HOT MELT - Adhesive that melts, and is fluidized by heating.

HOT STAMPING - Design transfer process utilizing a heated die to heat seal coated foil or metallized film to a substrate.

HOT TACK - The property of a heat seal to stick together when it comes under stress before cooling and developing strength.

HUMIDITY - Amount of moisture in the air. See relative humidity..

HYDROPHILIC - Substance property making it water receptive.

HYDROPHOBIC - Substance property making it reject water.

HYDROSCOPE, SWORD - Shaped for insertion into a pile to determine its moisture content compared to surrounding air.

HYGROSCOPIC - Substance property making it absorb water.

IMPRESSION - The pressure in printing required for ink transfer to a substrate. Also used to refer to a single print.

IMPRESSION CYLINDER - Cylinder that holds the substrate being printed against the printing plate cylinder or blanket cylinder.

INERTING - The blanketing of a curing environment from cure inhibiting oxygen using non-reactive nitrogen or carbon dioxide.

INFRARED or IR - The part of the electromagnetic spectrum between wave lengths from 0.78 micron to approx. 300 microns.

INFRARED or IR DRYING - Drying that is done utilizing heat generated by short and or medium wave IR emitters.

INHIBITOR - Chemical substance which will slow or stop a polymerization reaction. May be used to extend pot-life.



GLOSSARY

INKS, QUICK-SET - Paste inks made from special resin-oil composition which, after printing, separate quickly into a solid material that remains on the substrate surface and that is absorbed quickly into the substrate allowing dry like handling.

INORGANIC - A chemical term to define materials that do not contain carbon and hydrogen.

ION - Particle bearing an electrical charge.

IONIZING RADIATION - Electromagnetic radiation or particle that can produce ions in common materials, usually requires energies greater than 10 eV.

IRRADIATE - Light, expose or treat with a form of radiant energy.

KEV - One thousand electron volts. Level determines penetration.

KISS IMPRESSION - The lightest possible pressure that will still transfer ink or coating from a transfer roller to the plate and then to the substrate being printed.

kV - 1000 volts. Specifies EB electron accelerator voltage.

KRAFT PAPER - An alkaline process high strength paper, usually unbleached (natural light brown but may be bleached white), made from sulfate pine fiber pulp.

LAMINATE - A multi-layer product created by bonding two or more materials together.

LIGHT FASTNESS - The retention of color when exposed to sunlight or artificial light.

LINER - One of the two surfaces substrates of corrugated board.

LITHOGRAPHY (OFFSET) - A printing method, using a plate, where the image area is oil ink receptive and the non-image area is water (fountain solution) receptive, and non-ink receptive. Paste ink is offset to an impression blanket then to substrate.

LUBRICANT BLOOM - The migration of silicones, plasticizers, and/or waxes to the surface of a coating, ink or plastic causing a greasy feel or a cloudy, hazy appearance.

MACHINE DIRECTION - Refers to the process direction through a machine from front to back (parallel), while perpendicular to machine direction is the cross direction. In paper, with the grain.

MAKE-READY - The prep and correction prior to printing, before production to guarantee clean, uniform high quality impressions.

MAR RESISTANCE - Print and/or coating toughness when exposed to rubbing, scuffing and scratching.

MATTE - A dull finish with low non-reflective gloss.

MEDIUM PRESSURE MERCURY VAPOR LAMP - Source of UV light. Sealed mercury and inert gas containing quartz tube.

MEGARAD - Term describing one million rad dose in EB curing.

M.E.K. (METHYL ETHYL KETONE) - A fast drying, highly flammable, aggressive organic solvent used as a vinyl and nitrocellulose ink and lacquer solvent.

MICRON - A measurement unit equaling 25,400 to the inch.

M.E.K. RUB TEST - Chemical resistance test used to estimate the degree of cure of UV/EB and other cross linked coatings/inks.

METAMERISM - A circumstance where colors match under one type of light but do not match under another type of light.

METHACRYLATE - Radiation curing monomer.

MICROWAVE - Electromagnetic energy with a wavelength from .05 -5 cm used to power electrodeless UV lamps.

MIL - A measurement unit equaling 0.001 inch.

MILEAGE - The amount of total area effectively covered by a known volume of coating.

MISTING - Ink mist of tiny droplets thrown off a press by rollers.

MOISTURE CONTENT - Refers to the variable percent of absorbed or emitted moisture that is found in paper substrates.

MONOMER - The combining molecule that can form polymers.

MOTTLE - An uneven visual effect in solid print areas evidenced by small light and dark spots, blotchiness.

MSDS - Material Safety Data Sheet. Used to list the potential hazards of chemical products.

MULTI-WALL - A multi-ply structure, e.g., a bag.

MULTIFUNCTIONAL ACRYLATE - Chemical compound containing more than one acrylate functional group.

NEWTONIAN LIQUID - Fluids of absolute viscosity, e.g., water.

NEUTRAL - pH of 7, no acidity or alkalinity.

NEWSBACK - Refers to paper board with a back layer of very high ground wood newsprint substrate.

NIP - The contact point between two rollers.

NON-POLAR - Refers to a material having no concentration of either positive or negative electrical charges on a molecular scale such that adherence to it is difficult.

NONVOLATILE - Not given to vaporizing or evaporating quickly.

ODOR, RESIDUAL - Any foreign odor retained in a material after a manufacturing or converting process is complete.

OLEFIN - Carbon-carbon double bond ethylene derived plastics.

OLIGOMER - Lower molecular weight, usually liquid or liquifiable polymer or resin used in UV-EB formulations.

OPACITY - The opposite of transparency, the ability to block light.

OPTICAL BRIGHTENER - Fluorescent organic compound which absorbs UV light and emits it as visible blue light. Used to mask unwanted yellowness in coatings, papers and textiles.

ORANGE PEEL - A form of ink or coating mottle that gives the rough, irregular appearance of the surface of a citrus orange.



GLOSSARY

ORGANIC - Chemical compounds containing carbon.

OVERPRINT - The printing of one impression over another.

OXIDATION - The chemical union of oxygen with some other substance, e.g., the combination of oxygen over time with an ink vehicle to produce a dry ink film.

OXYGEN INHIBITION - Termination or slowing of polymerization by oxygen exposure deactivating radicals.

OZONE - Unstable chemical substance with a sharp odor having three oxygen atoms formed by a high energy discharge in air.

PACKAGING, FLEXIBLE - Pouch packaging made from various films, foils and paper combinations. End or side sealed.

PANEL - A "face" or "side" of a box or carton.

PARAFFIN - A white, waxy, odorless hydrocarbon derived substance used as an ink and coating slip additive and as a water proof coating on paper and paperboard.

PENCIL HARDNESS (ASTM D3363-74) - Cure test using chisel tipped varying hardness pencil leads to assess scratch resistance.

PENETRATION - Capable of striking into a substrate.

PERMEABILITY - The ability of a gas, vapor or liquid to pass through a substrate.

PHOTOINITIATOR - Compound capable of absorbing light and producing enough energy to initiate a polymerization reaction.

PHOTOSENSITIZATION - Development of an abnormal reaction to sunlight producing dermatitis and edematous swelling.

PICKING - Lifting of any part of a paper surface during printing .

PIGMENT - A coloring powder material, usually mineral, inorganic and insoluble.

PILING - A build-up of ink on press rollers, plate, or blanket.

PINHOLING - Very small holes in a substrate, ink or coating film.

pH - A symbol denoting the acidity or alkalinity of a substance. A value of 0-7 indicates degree of acidity while 7-14 indicates degree of alkalinity with 7 regarded as neutral.

PHOTOPOLYMERS -Class of photo sensitive materials that under go a change of properties when exposed to UV or visible light. Makes fine detailed printing plates and coating blankets.

PLASTICIZERS - Additives that are used to improve flexibility.

POINT - A term used to indicate the thickness of paper or paperboard in one-thousands of an inch (.001").

POISE - A unit measure of viscosity equaling 100 centipoise.

POLAR - Concentration of positive or negative electric charges on a molecular scale Adherence is easy to polar materials.

POLYACRYLATE - A clear thermoplastic composed of polymers of acrylic acid and its esters. Very light stabile it is used in film, sheet and in resin form in coatings.

POLYESTER (PET) - A resin formed by reacting organic dibasic acid and dihydroxy alcohol. Used to make cross-linked thermosetting resins and high gloss coatings as well as packaging films and blown bottles.

POLYETHYLENE (PE) - Translucent thermoplastic made by the polymerization of ethylene. Makes grease and water resistant packaging films, containers and surface laminated paperboard.

POLYMER - Chemical substance of multiple repeating small molecules.

POLYMERIZATION - A chemical reaction in which two or more molecules (monomers) combine to form a linked, chainlike macromolecule or polymer.

POLYOLEFIN - A polymer of olefins (unsaturated hydrocarbons of the ethylene series), such as polyethylene and polypropylene.

POLYPROPYLENE (PP) - A clear, tough, highly resistant light weight plastic made by the polymerization of propylene gas. Used extensively as a flexible packaging film.

POLYSTYRENE (PS) - A water-white thermoplastic made by the polymerization of styrene (vinyl benzene). Used in films, thermoforming and injection molding.

POLYVINYL ACETATE (PVAC) - A colorless thermoplastic composed of polymers of vinyl acetate. Used in adhesives for heat seal papers, coatings and as bases for inks and lacquers.

POLYVINYL ALCOHOL (PVA) - A colorless thermoplastic composed of polymers of the hypothetical vinyl alcohol insoluble in most organic solvents but soluble in water. Used in adhesives, coatings and as water soluble films.

POLYVINYL CHLORIDE (PVC) - A colorless thermoplastic composed of polymers of vinyl chloride offering outstanding resistance to water, alcohol's, concentrated acids and alkalies.

POLYVINYL CHLORIDE ACETATE (PVCA) - A colorless thermoplastic composed of copolymers of vinyl chloride and vinyl acetate with good water resistance.

POLYVINYLIDENE CHLORIDE (PVDC) - A thermoplastic composed of polymers of vinylidene chloride yielding an excellent WVTR barrier in thin film form.

POST CURE - Cure continuation after UV-EB exposure is over.

POT LIFE - Refers to the period of time that a two-part ink, coating, or adhesive system once mixed remains suitable for use.

PPM - Abbr. for parts per million. Represents the parts of vapor gas in each million parts of air by volume.

PRIMER - A light base coat applied to a substrate to improve holdout, increase adhesion between a top coating and a substrate, and improve printability

PRINTABILITY - The property of a substrate that yields good quality printed matter which is related to ink receptivity, uniformity, smoothness and opacity.

PROCESS CONTROL - Use of statistical quality control methods to evaluate and continuously improve future performance.



GLOSSARY

PROOF - Test print of an ink, varnish, coating, or a combination

P. S. I. - Pounds per square inch, gauge pressure.

PULP - In paper making the fibrous material processed before dispersion and reforming on a paper making machine.

PYROMETER - A high temperature reading instrument.

QUICKPEEK - A laboratory piece of equipment that allows a given quantity of offset paste ink to be printed on a substrate closely reproducing the actual production printing process.

QUARTZ TUBE - Hi-temperature resisting lamp used to house an IR emitter or produce UV light when filled with mercury vapor.

QUICK SET - Offset paste inks formulated to set quickly immediately after printing to avoid setoff transfer to the backside of the next sheet in a pile and handling without smudging.

RAD - The energy imparted by an electron equal to 100 ergs of absorbed energy per gram of treated material.

RADIATION CURABLES - Materials which polymerize (cure) when irradiated with EB (accelerated electrons) or UV.

RADIOACTIVE MATERIALS - Substances that radiate particles or rays, such as alpha, beta and gamma rays, by the spontaneous disintegration of atomic nuclei. (Not to be confused with EB or UV which do not rely on radioactivity in any form).

REACTIVE DILUENT - Chemical that thins and during cure reacts.

REAM - 500 sheet quantity of paper, usually 3000 sq. ft.

RELATIVE HUMIDITY - The amount of water vapor present in air given as a percentage of the amount that will saturate the air at a given temperature.

RELEASE - To overcome adhesion or break free.

RELEASE COAT - Coating used to prevent adhesion to and allow release from backing papers for pressure sensitive stocks.

RESIN - Natural or synthetic polymeric materials.

RETARDERS - Additives used to slow down a chemical reaction, or evaporation rate.

REVERSE PRINTING - Printing on the backside of the viewing side of a transparent film.

RHEOLOGY - Refers to the change in the flow (viscosity) and form (plasticity) of matter. Used with reference to paste inks.

ROLL COATING - A coating method where coating is metered and smoothed through transferring over a series of rollers with the last down roller usually running in the web direction or the last down roller may be run in reverse for better smoothing.

ROLL-OUT - Ink, varnish or coating spread for testing on a substrate panel using a hand roller.

ROOM TEMPERATURE - Refers to the ambient or usual surrounding temperature between 70 and 80 degrees F.

RULE 66 - The beginning of air quality control regulation made law by Los Angeles County to reduce smog produced by the photochemical interaction with Volatile Organic Compounds, later used by the USEPA as a minimum guideline.

SCANNED BEAM - A rapidly scanned, thin, pencil-like beam of accelerated electrons that yields an area of irradiation.

SCORE - An impression or crease made to allow folding.

SCOTCH TAPE TEST - An adhesion test where the tape is pressed to a printed/coated surface and removed in a specified manner to determine the degree of ink/coating removal if any.

SCUFF - Substrate surface abrasion.

SCUMMING - The undesirable tendency for the non-image area of a plate to take on ink from any cause.

SEAL - To close or bond securely as with adhesives or heat sealing for security, air or water tightness, or as in surface sealing.

SENSITIZATION - Exaggerated (allergic) response after reexposure by a human or animal to a chemical substance.

SENSITIZER - Substance that may not cause an exaggerated (allergic) human response until after repeated exposure.

SETOFF (OFFSET) - The undesirable transfer of ink from a print to the back-side of the next sheet in the press delivery pile.

SETTING OF INK - First drying phase of ink usually by substrate absorption of oil allowing handling without smudging or set-off.

SETTING TIME - Time required to cure an adhesive or coating.

SHEAR - When adjacent layers in a liquid or plastic are moved or slid parallel and opposite to one another during flow.

SHEET-FED - The process of feeding a material in sheet form as opposed to web form to a machine.

SHELF LIFE - The time that a packaged product will retain its freshness and remain usable.

SHELL CUP - Numbered orifice cups used to measure viscosity.

SHORTNESS - Lack of flow or a tendency to stringiness in a paste ink. Opposite of long.

SHORT WAVE IR - Wavelengths between 0.76 and 2 microns, which reflect from light substances and penetrate dark colors.

SIGNATURE - Describes a web print copy after it is folded.

SILICONE - Organic silicone compounds used as additives to provide superior release and slip properties along with high heat and excellent water resistance.

SILK SCREEN PRINTING - A printing method where an ink or coating is squeezed through unblocked areas of a woven metal or fabric screen to a substrate.



GLOSSARY

SIZE - A water resisting material added to paper during paper making or also an ink that dries sticky to hold metallic powders.

SLIP COMPOUND - An ink or coating additive used to give lubricating or slip properties to the dried film.

SMOOTHNESS - The texture of the surface of a substrate compared to that of a perfect surface such as glass.

SOLVENT - A substance, usually an organic liquid that is able to dissolve another substance.

SOLVENT BASED - A coating, varnish or ink whose vehicle binder is solvent soluble or dispersible.

SOLVENT RETENTION - The undesirable condition that occurs when the solvent in inks, coatings and/or adhesives are not completely evaporated from the substrate involved.

SPECIFIC GRAVITY - Ratio of the weight or mass of a specified volume of a substance to that of water for solids and liquids.

SPECULAR REFLECTION - Mirror like reflection of visible light.

STABILITY - The ability of an ink, coating or adhesive to remain in usable form during exposure to application conditions.

STRENGTH (GREEN) - The strength of an adhesive after evaporation/absorption of its liquid component before final cure.

STRIATION - An undesirable streaky, parallel groove pattern seen in faulty varnish, adhesive and coating application.

SUBLIMATION - When a solid changes to a gas state without going through a liquid state first.

SUBSTRATE - Refers to any material on which we print, coat, varnish, laminate, extrude, use adhesives.

SULFATE - Alkaline wood chip pulp cooking process that produces Kraft paper.

SULFITE - Acid wood chip pulp cooking paper making process.

SUPERCALENDER - A very high gloss paper finishing process involving the use of alternate chilled cast iron and paper or cotton rolls in a supercalender stack under pressure.

SURFACE TENSION - Molecular cohesive forces in a liquid that causes the exposed surface to want to contract to the smallest possible area. Measured in dynes/sq. cm. Lower surface tension means better wetting capability.

SYNTHETIC PAPERS - Non-cellulosic (wood pulp) "papers" that are made from various plastic materials.

TACK - The sticky resistance of an ink film to being split between two surfaces, e.g. between rollers, between plate and blanket, between blanket and the substrate being printed.

TEFLON - A polymer of fluorinated ethylene used as a slip agent.

THERMOPLASTIC - Materials that are subject to softening, deforming, or melting when exposed to heat.

THERMOSET - Materials that become permanently hard (cured), insoluble and infusible when cooled after exposure to heat.

THICKENER - An additive used to increase viscosity.

THIXOTROPIC - Liquids that become more fluid with agitation and recover and stiffen again when agitation is stopped.

TRANSFER - A term used to describe the conveyance of ink or coating between two surfaces.

TRANSLUCENT - Passes light but diffuses it so that it is not possible to see through it clearly.

TRAPPING - The printing of one ink film on top of another. Wet trapping is when wet ink is printed onto another wet ink. Dry trapping is when wet ink is printed onto another dry ink. May also apply to varnishes and coatings last down over inks.

TWO POT (TWO PART) SYSTEMS - Ink, coating or adhesive systems where two reactive components are mixed together immediately before use. (See pot life).

ULTRAVIOLET (UV) CURING - Process where UV light usually sourced from a medium pressure, high intensity, mercury arc quartz tube converts liquid inks and coatings to cured solids.

ULTRAVIOLET CURING LIGHT - Electromagnetic radiation having a wavelength range between 185 and 400 nanometers.

VACUUM METALLIZING - The process in which surfaces are coated thinly with a metal that has been evaporated in a vacuum.

VAPOR PRESSURE - Pressure created by the saturated vapor above any liquid express in mm of mercury at 20 degrees C.

VARNISH - A liquid resin coating applied usually over a printed surface to offer protection and improve appearance. Also used to describe these products applied through a printing press inker.

VEHICLE - The liquid part of an ink that carries pigment and gives workability, drying properties, and binds pigment to the substrate after the ink is dried.

VISCOMETER - An instrument used to measure viscosity of liquids such as a Brookfield. or Laray.

VISCOSITY - Internal friction of a liquid that makes it resist flow.

VOLCANO - A volcano crater like printing/coating surface defect.

VOLATILE - Evaporates easily changing from a liquid to a gas.

WASH-UP - Process of cleaning printing press, and coater parts.

WATER BASED - A coating, varnish, or ink whose vehicle binder is water soluble or water dispersible.

WATER RESISTANT - Withholding water for a period of time.

WATER VAPOR TRANSMISSION RATE (WVTR) - Also MTV (Moisture) both of which are a measure of moisture pickup through a substrate in a given time/humidity condition expressed as grams/100 sq. in./24 hours.

WAX - Slip and rub resistance improving additive.

WEB - A roll of continuous substrate.

WEB OFFSET - A litho printing process feeding roll substrate.



GLOSSARY

WEB TEMPERATURE - Temperature of the substrate web in the oven of a dryer, differentiated from the oven temperature.

WETTABILITY - Measured affinity of a liquid to a surface by contact angle formed between a liquid and a surface. Complete wettability = zero contact angle. Non-wettability = +90 degrees.

WETTING AGENT - Chemical material (surfactant used to reduce the surface tension of a liquid to improve surface wetting.

WIRE SIDE - Surface of a paper sheet formed next to the wire when formed as opposed to the smoother felt side.

WORK & TURN - Printing of the second side of a sheet turning it over from left to right using the same paper edge as gripper.

X-RAY - Electromagnetic energy with a wavelength range of about 0.1 and 10 nanometers, between gamma rays and UV; produced when accelerated electrons are stopped in matter.

ZAHN CUP - Numbered orifice cups used to measure viscosity.