



**2008
January**

Printing on Containers

What would "Have I Got News for You" panellists say about the sad man who writes about printing onto bottles? "He's popped his cork." "He has imbibed on the contents and we have 100% proof of it." "That guy must have a screw cap loose." "Gentlemen," for the panellists are normally of said gender. "You don't recognise the importance of container printing." We are in a world where buying decisions are "lifestyle choices," that means customers purchase because it makes them feel good, how a product looks and how the customer is perceived because they purchase a product are crucial factors. Take for example lemonade. You can pay 21p or £1.00 for two litres of fizzy water with a range of additives. The £1.00 PET bottle of drink has a multicoloured label that is associated to a frenetic television commercial saying what fun life will be if you drink a drink that contains more E numbers than you find on the floor of a rave club during a police raid. The 21p "Basics Range" however is very similar but with a single colour label that lays in your trolley like a free school meal voucher. I prefer the cheap stuff so have to accept the pitying glances of the checkout girl who becomes a little confused as she then picks up the prime fillet steak and free range chicken that follow. One of the advantages of having left puberty some while ago is that you really don't give a toss what people think about your lemonade purchasing habits. Fortunately for our industry most people do care about how they are perceived by others particularly during that public exposure of the supermarket trolley.

Continuing the supermarket theme briefly. If you look o the "Bargain" shelf you will see bottles of wine at a reduced price simply because the label is torn or twisted, this demonstrates how fickle customers can be. Just one more thing. How to get arrested in M&S without shoplifting. Peer closely at a series of posters in the lingerie department to see how the printing machine has coped around the flesh tones in the 50% tonal range. Need I say any more!

One of the busiest sectors of our industry at the moment is glass bottle printing. Having used vast numbers of PET labels on bottles designers and marketers are recognising the caché of direct printing onto glass bottles is having on their products. Just look at premium glass cosmetic bottles, they are all directly printed. The designs are either fired into the glass or printed onto the glass with UV Curing inks designed for the purpose.

Traditionally it has only been possible to achieve a degree of permanency with glass based enamels that are fired onto the glass at elevated temperatures. These are ceramic enamels are mixed with a thermoplastic material that become liquid when placed onto electrically heated screens. When they contact the surface of the cold glass container, the mixture solidifies immediately. The printed glass has to be passed through a lehr where it is fired at temperatures between 590 - 650 degrees °C to fuse the enamel to the glass. The glass then has to be annealed by slowly cooling it down to ambient for handling. This can take several hours. It is very expensive in energy usage, capital cost of the lehr and the fact that it will slow down the printing process. The lehr can be 30 metres in length so it is not a proposition to be taken on lightly. The advantages are that high temperature fired enamels enable high gloss metallic pigments to be used as well as inorganic pigments. Resistance to abrasion and chemical attack is very good as the pigments are bound to the glass by the melted glass particles in the enamel. There are

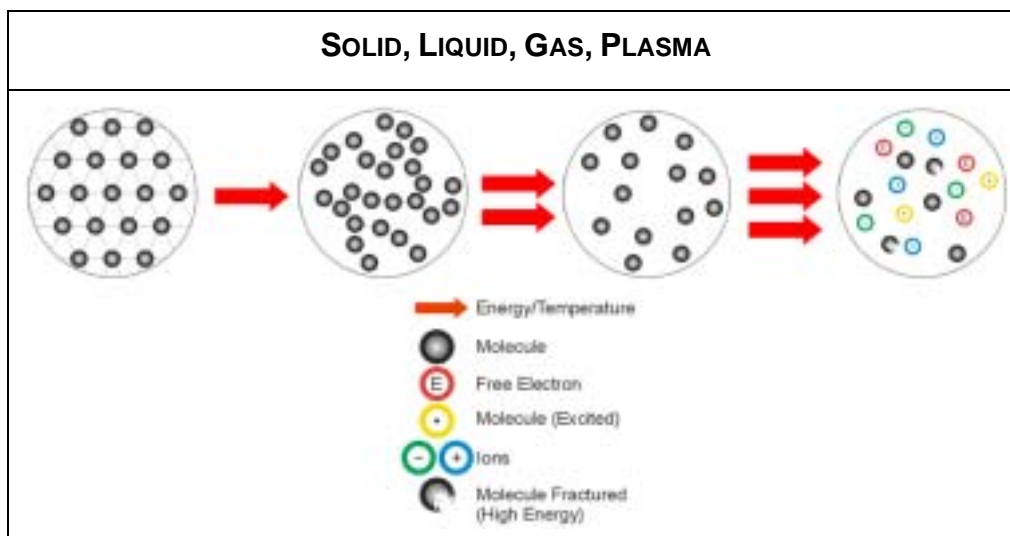
issues regarding the toxicity of some of these enamels and those containing lead or heavy metals are restricted in their use.

UV PRINTING INKS

There has always been a wish by printers not to have to use these systems but inks with organic pigments have never been particularly successful as their mechanical/chemical resistance and adhesion to glass has never matched the inorganic fired on systems. Improvements in UV Curing ink systems have made this substitution in all but the most arduous applications a reality. The UV Systems have adhesion promoters that decrease the pot life but improve performance. Some also recommend post curing at 140°C for 20 to 30 minutes. An alternative is also to spray the glass with a UV curing coating that will accept the UV ink very effectively. Probably the best solution is to pre-treat the glass to provide a suitable surface onto which the UV inks will adhere. Ink manufactures suggest flaming the glass before printing but the most successful system is Plasma Treatment. Plasma treatment is used in numerous applications for improving adhesion. Plasma is the fourth state of matter it uses electrons and molecular debris to alter the surface structure of a material and allow it to be wettable by the ink.

PLASMA PRE-TREATMENT

Plasma is based on a simple physical principle. By supplying energy the states of matter change: from solid to liquid and from liquid to gas. If further energy is now added to a gas it becomes ionised and passes over into the plasma state, this is an additional state of matter.



On contact with the substrate to be printed the added energy in the plasma is transferred to the surface and alters the surface to accept an ink. Plasma will treat virtually any material and its effect is to raise the surface energy of the surface and enable it to be wetted by the ink or other material that is designed to form an adhesive bond with the

surface. Glass, Silicone Rubber, Teflon are all materials that have been difficult if not impossible to stick to, Plasma Treatment enables adhesion to be achieved.



Plasma arc is blown onto the surface to be treated with compressed air. Although the temperature is 300oC the surface temperature is only raised by less than 20 oC. This makes it suitable for use on delicate substrates. Flaming is an alternative that has a lower initial capital cost but it isn't as effective Gas Plasma. The Plasma not only increases the surface energy of the substrate but it also removes contamination making it a very clean surface.

IRREGULAR SHAPED BOTTLES AND COMPONENTS

Bottles and containers are no longer just cylindrical some are square or triangular and there are printing systems available that enable the printer to print all the way around a square profile with round corners. In this instance all the movements are servo driven using CNC technology enabling the squeegee and flood coater assembly to rise and fall in sequence with the stencil that also moves to keep the off contact distance the same.

SERVO DRIVEN SCREEN PRINTER CNC 1000G



Courtesy of Werner Kammann Maschinenfabrik GmbH & Co. KG

The systems make it possible to program the movements for a whole range of bottles and recall them instantly for each set up. These systems are sold as single or multicolour units. They give tremendous versatility to a printer who has a wide range of bottle profiles that were previously very difficult to print.

GLASS BOTTLES PRINTED ON CNC MACHINE

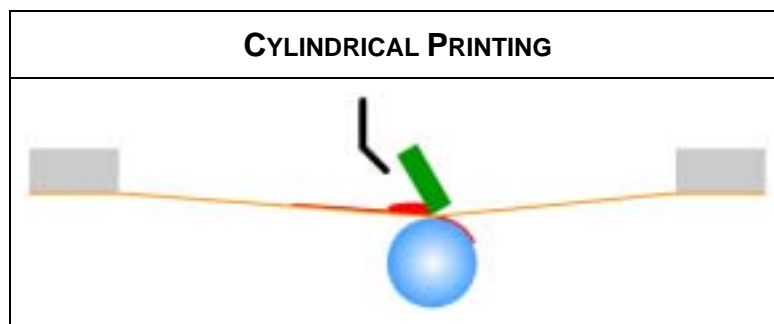


Courtesy of Werner Kammann Maschinenfabrik GmbH & Co. KG

BASIC CONTAINER PRINTING

With very little degree of sophistication flat, cylindrical and oval bottles and containers can be printed. No matter what the shape they have to be wettable by the ink that means at least 42 Dynes cm and generally flaming is the cost effective solution.

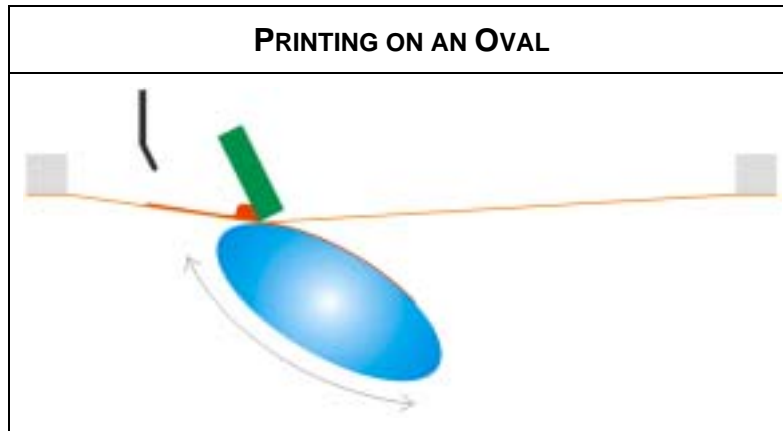
When printing cylindrical items one of the keys to success is ensuring that the squeegee is aligned to the top dead centre of the cylinder. Squeegee pressure should just be enough to keep stencil in contact with the bottle over the complete print area. If you want to print multi-colours ideally you want a positioning ramp in the bottom of the bottle.



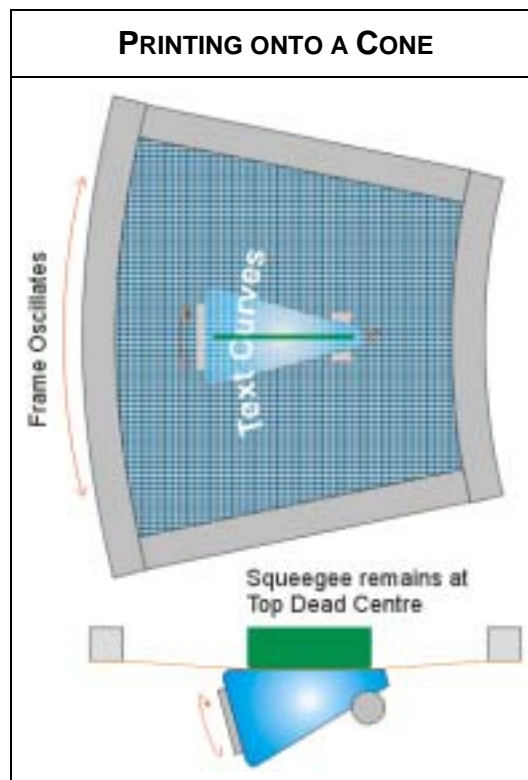
Following the principle of the stencil maintaining contact with the bottle throughout its image area, if the bottle is deliberately uneven it is necessary to shape the squeegee to suit. You don't need a special machine for this but it is sometimes better to use a Nylon (Polyamide) mesh as it is more flexible than the conventional polyester.



An oval is printed in a similar way to a cylinder except that the printed surface moves on the circumference of a circle in the opposite direction to the stencil.



Printing a cone however needs a different mechanism on the machine. This swings the bottle at the same time as it rotates. You will get away with a few degrees of taper on a bottle with a conventional mechanism but obviously conical shapes will need the additional movement in the printing process.



Screen printing 3 Dimensional objects can be very interesting. The same fundamental principles apply as to other forms of screen printing. Be consistent in setting up and operating the machine, produce a good quality stencil, make sure the components are clean and wettable by the ink. Because of the varied contents of containers and the materials containers can be made of; the inks used have to be carefully selected. Using four colour process is particularly challenging as it is very difficult to measure the printed



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result, even so some wonderful effects are achieved. When you are buying the perfume for your beloved take a look at the bottle and consider how it was printed. As you pick up the very expensive hair conditioner admire the edge definition and the fine detail. Don't worry you won't get arrested for that!