

Scent Effects in Screen Printing – Technology and Possibilities

The industry invests around 2.5 million euros a year in advertising budgets. The percentage of scent marketing in its varieties room scenting and print media applications is still low, although previous experiences and tests have had extremely positive results. According to an analysis by the research group “Konsum und Verhalten” (consumption and behaviour) of the University of Paderborn, the length of time customers stay in a shop can be increased by 15.6% by scenting the sales zones, while the desire to purchase can be increased by 14.8% and the turnover even by 6%. Successful print advertisements with interactive scent elements reveal that the contact time with the medium can be increased considerably. In other words, it is a potentially interesting growth market, which we as screen printers would like to co-create with our especially suitable, technical application system. At the same time, however, it represents a new field of activity which still has to be fully discovered in respect to opportunities, concepts and effectiveness.



The unusual attracts attention

The sense of smell, like all the other senses, connects us directly to the outer world. The senses communicate as an elementary interface between the physical and psychic world. However, experience shows that only a modification in what is known stimulates the attention of the senses. This also applies when using aromatic substances. What people smell every day can be an impressive spectrum of scents, but only what is new and unusual will be registered in the brain as worthy of attention. This property of the “unusual” in scents not only depends on the type of the smell and its intensity but also the moment and place of occurrence and the combination with other influential factors.



If you pass a bakery in the early morning on the way to work and feel the fresh smell of coffee in your nostrils, you will instinctively have a mouth watering feeling making you want to sit down and have breakfast. If you smell the same coffee aroma while traveling home by rail or tram, you will probably perceive a disinclination, as you have already drunk enough coffee throughout the day and feel more like a glass of cool beer.



Creating scent effects

The effective use of scent effects in screen printing therefore requires careful planning and coordination of the methods and procedures. As in all advertising projects, the holistic design is first and foremost. The scent effect should not fulfill any self-purpose for this, but instead intensify an existing positive message and must therefore always be regarded as a supplementary component. A crude onslaught of smells surprising hapless individuals leads to rejection rather than acceptance and results in an early end to a subject that would otherwise be very promising.

Predominantly synthetic components

Scents, in particular those for the uses described here, are at present predominantly produced synthetically. Synthetic substances have the same chemical nomenclature as substances of a natural origin. The designations in the INCI Declaration therefore reveal nothing about their origin. For the relatively realistic chemist, the commercially used 1'000 raw materials - irrespective of their origin - are groups of the terpenes, esters, aldehydes, ketones and alcohols. In other words, the smelling variants of the screen printers well-known solvents.

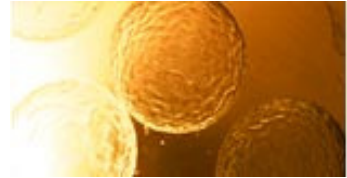


Careful planning prevents unwelcome surprises

Every aromatic substance behaves differently in combination with materials. The olfactory and technical development of the specimens suitable for printing technology should always be handled by specialists who are very familiar with the crucial technical criteria of the subsequent processes. Otherwise, an attractive flower bouquet can mutate into a stinking entity after printing. From experience, it is advisable to directly involve the end customer in the development of the scent components for larger projects, in order to obtain a binding approval on the basis of a printed original sample. The perception of the scents is naturally subjective and depends on the current state of mind of the person smelling the fragrance.

Technical possibilities for creating scents

Various processes for scent illustration can be used in screen printing. Basically, we distinguish between the continuous release of scents and the release as a result of mechanical stress (micro-encapsulation). In order to attain a continuous release of the scent effect, appropriate scents are incorporated in a suitable printing ink system. This printing ink system contains special functional fillers which temporarily bind the scented oils used and release them through diffusion with a corresponding delay. Diffusion is the process whereby freely moving molecules expand out through permeable barriers according to the law of Brownian molecular motion. The binding agent of the printing ink therefore has the function of such a permeation layer, through which the scents can be released outwards analogously to their volatility. An advantage of this variant are the relatively low costs, as the expensive micro-encapsulation is no longer required. A disadvantage involves the fact that the scent release is essentially uncontrollable and occurs with diminishing intensity over a time period of only a few days.



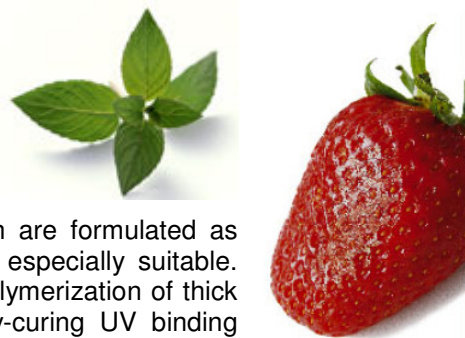
Micro-encapsulation refers to the inclusion of small particles of a substance in a thin casing, usually a polymeric compound. At the same time, the properties of the encapsulated core material are advantageously combined with those of the wall material. The wall material insulates the packaged particles from other components and the external environment until the capsule casing is destroyed by physical or chemical action. In this way, active agents can be released in a controlled manner or different reaction participants mixed to achieve a specific result.

Matching the printing ink systems

A crucial condition for successful scent printing involves the compatibility of the micro-encapsulation with the ink and adhesive systems available. The main criteria are the resistance of the capsule casings to the raw materials used in the binding agents and the inherent smell which every workable material exhibits on account of its composition. An intrinsic smell, however, can also continue to influence the scent illustration, and in some cases may also have a disturbing effect, after drying or polymerization of the printed ink film. Owing to the chemical proximity of several ingredients to synthetic scent components, problems can result with solvent-based binding agents in particular.

Optimum combinations

Water based systems are better suited, insofar as they do not contain any elements of strongly smelling pH-stabilizers. A further advantage of these binding agents lies in the fact that they can be processed with the somewhat cheaper aqueous slurries. A serious drawback involves the limited selection of printing materials which are reduced to the groups which exhibit sufficient stability against water. On the basis of our previous experiences, UV-curing systems which are formulated as smell neutrally as possible in respect to the application are especially suitable. Product-technical benefits also result in regard to the rapid polymerization of thick color films. A further improvement is offered by cationically-curing UV binding agents which can be almost odorless in a non-polymerized state and which combine this advantage with the rapid processing speed of the radical UV binding agents. The disadvantage of these systems is a somewhat higher raw material price which, however, is not necessarily critical for the total costs of the application.



Layer thicknesses and fabric selection

The nature of screen printing enables highly viscous workable substances to be processed almost without problem and substantial layer thicknesses to be attained. Both properties ideally correspond to the requirements of scent illustration. The use of screen fabrics with a division of 43 threads per centimeter has proven best in practice. A full and even ink application can be attained with these fabrics, which still contain sufficiently encapsulated active agents in the deeper layers in order to have a sustainable effect in longer lasting applications.

If it is necessary to work with finer fabrics for technical or visual reasons, the rule of thumb "maximum capsule diameter times a factor of 4.8" is a good starting point for ascertaining the corresponding fabric division.

Careful machine setting

When printing scent effects, we do not require any polymeric separators between the printing form and printing material, which are typically indispensable in offset printing. Our screen fabric assumes the function of these capsules perfectly. As a result, we work with little active substance loss through capsules destroyed during printing. A further reduction of the process-related destruction of the microcapsules can be achieved if all the machine parameters are set with the aim of avoiding unnecessary friction in the printing process. The RKS carbon squeegee with a 65 Shore print edge has proven to be especially suitable. The highly effective carbon stiffener makes it possible to print with a very flat contact angle of about 70°, without leading to a deformation of the squeegee with correspondingly high shearing of the advancing ink roll.

Scent development during production

Even when adhering to all the recommendations, capsule fractures inevitably result during the printing process. This minimum loss does not affect the functional capability of the printed layer. Nevertheless, it is obvious that the partial release of scents will have an effect on the ambient air in the printing room. Many individuals may experience sensitive reactions to these scent concentrations. It is therefore advisable to discuss the planned use of scent effects in advance within the company and make sufficient allowances for such sensitive reactions.



Some formulation rules

When formulating scent effects, it must be noted that the addition of microcapsules can easily lead to a slight delustering of the printing inks and varnishes. Although the effect is only minor on the coloring of bright colors, varnishes lose some transparency, depending on the amount added. In the interest of a good scent illustration, the printed elements should exhibit an area of at least 15 cm². It goes without saying that the olfactory ink always has to be at the top, in other words not covered by other layers.

The use of several scent effects on one object is especially critical. This can consequently result in a collision of smells, whereby the individual scents may possibly combine to produce an unpleasant overall effect.

Cost of scent effects

The costs are generally divided between the creation and production of the base oil, the micro-encapsulation and the printing ink. The ink system selected most certainly has the smallest percentage proportionally in the material costs. An exact indication of the procurement prices for scent effects is not possible owing to the many variables. In general, however, it can be stated that standard scents such as orange, lemon, gingerbread, fir tree, spring meadow and autumn mood are already available at between 100 and 200 euros per kilogram of printing ink. This offer for standard scents is continually subject to change. Whoever wishes to experiment a little beforehand should inquire which standard scents are currently available in which quantities. The Printcolor Group has a reasonably priced test set for its customers, which contains eight different standard scents, enabling you to become acquainted with the subject (see also "**Attractive standard scents from the stock**", at the end of this article).



Special scent developments

It is, of course, significantly more expensive if special scents have to be created outside the available standard spectrum. Here the costs soon add up to four-figure sums. In the case of special productions, minimum quantities of approximately 10 kilograms of microcapsule powder usually apply, which result from the smallest batch size of the encapsulation systems. 100 kilograms of printing ink are then available when using 10% scent capsules in the formulation.

Current and future applications

If it is correct that 98% of all advertising information is not perceived at all and the average perception duration of advertisements is just 2 seconds, there must be considerable potential benefits in additional stimuli a priori. If these additional stimuli – such as our scents – appeal to a further, previously neglected sense, the potential applications should therefore be almost unlimited.

Packaging whose fragrance hints at the content inside, displays in the car showroom which smell of a trip in a convertible and décor which not only feels like leather but also smells like it? Advertising letters for the pizza service with the irresistible aroma of a crispy margherita? Do you think of documents, children's books, safety documents, car parts, textiles as well?

New dimension in brand development

The long time stability of human memory when it comes to smells can very effectively be used for establishing a brand loyalty. The maybe most significant future potential for scent effects therefore belongs to the area of corporate identity. Why should a strong brand only be supported by colors and forms? A refined and unmistakable corporate smell of fresh flowers or precious woods is capable of establishing a much longer lasting image in the memory than the traditional design elements alone. The “corporate smell” basically complements the “corporate identity” of a company. The identity of a company or a brand is extended by the olfactory sense.

The sum total of all possibilities

The recipient has no opportunity to withdraw from the scent marketing. While purely visual advertisements can be browsed through and bulk mailing can be thrown in the wastepaper basket without looking at it, olfactory stimuli cannot be avoided. Immediately afterwards, you are required to handle the new advertising dimension “scent” responsibly in order to avoid a premature inflation of the effect and an inappropriate nuisance to others.

Attractive standard scents from the stock

Printcolor Screen Ltd. has singled out 8 fragrances as standard from a broad spectrum of diverse scents, which ensures permanent availability from the stock. The following scent variations are available for selection:

- SS300 Strawberry
- SS301 Orange
- SS303 Red rose
- SS305 Leather
- SS306 Gingerbread
- SS310 Wood
- SS311 Peppermint
- SS312 Coconut

These scent capsules can advantageously be used in water-based ink systems, as no disturbing side-effect smells arise through solvents or through monomers or initiators in the case of UV-curing inks, which would otherwise result in a noticeable shift in the scent to be expected.

