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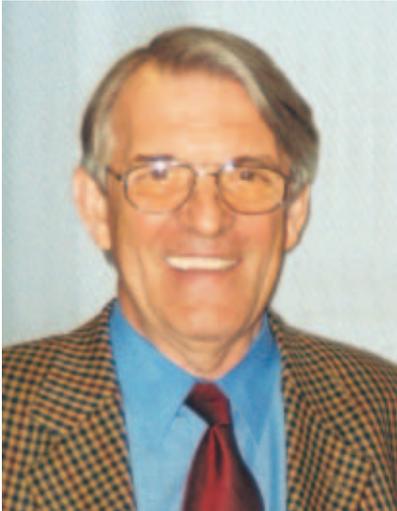
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From EUROPE to ISO:

What is the Intention of the new Colour Scale for Offset?

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The „European Colour Scale“ is dead! Since a long time, process colours have shifted away from the original specifications laid down 1975 in the old International Standard ISO 2846. Therefore it was revised in 1996 and, after some time, as colour standard, its place is now in the front rank. Although printers still have the „Euroscale“ in their heads awareness of the new 2846-1 colour scale is gradually increasing amongst customers, prepress people and printers.

It is emphasized in this publication that the colour standard specifies exclusively colour and transparency of process inks together with tolerances. This colour standard is not tailored to give any information on tone value increase or ink trapping.

Colour standard and process standard

The aim of every print job is to reproduce the original as closely as possible and to minimize colour fluctuations during the run. In order to achieve this objective more closely and after producing several predecessors, the bvdm German Technology Research Association and FOGRA published a handbook for the standardization of the offset printing processes in 1989. The major features of this handbook were later incorporated into the ISO 12647-2: 1998 International Standard. This is currently being revised and the new English language edition is planned for 2004.

Besides maintaining process parameters, in order to achieve a match with the printed results the properties of the materials, especially those of the paper and inks, must be the same or at least similar. The process stan-

dard therefore classifies printing papers into five types and specifies different colour values for the process inks on these paper types. The colours of the process inks are specified in a separate colour standard, ISO 2846-1.

This standard and its predecessor, the European Colour Scale – DIN 16539 – was developed to allow offset printers to obtain a similar colour when printing normal ink layer thicknesses on the same substrate with sets of process inks originating from different sources. ISO 2846-1 specifies the colour values to be achieved within given tolerances when standard printing inks are printed within a specified range of thicknesses by means of a laboratory printability tester on a reference paper free of optical brightener (APCO III/II from Scheufelen Inc.). When printed under standardized conditions on production run paper, the colour values laid down in the

aforementioned process standard (ISO 12647-2) should be achieved within specified tolerances (fig. 1).

Part 1 of the ISO 2846 series of International Standards deals with inks for sheet fed offset, heat-set web offset printing and radiation curing offset inks as well as continuous form printing. The other parts of the series deal with newspaper printing (part 2), illustration gravure printing (part 3), screen printing (part 4) and flexo printing (part 5, in preparation).

European Colour Scale is no longer significant

The colour values specified in the original DIN 16539 colour standard, which achieved world-wide importance as the „European Colour Scale“ and which was published as far back as 1975 also as ISO 2846, were based on extensive research by

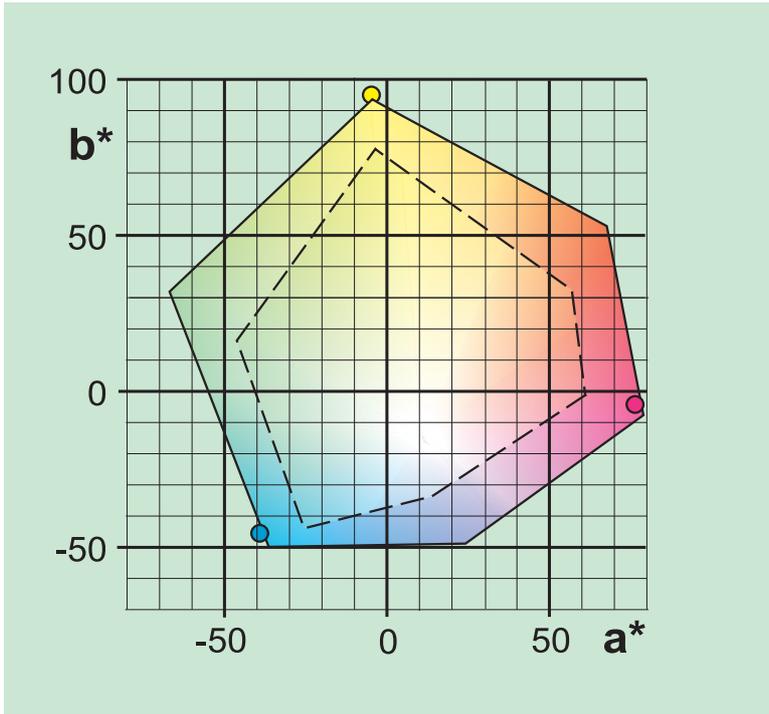


Fig. 1: Colour gamut in offset in accordance with ISO 12647-2 on paper type 1 (-) and paper type 4 (---), colour coordinates in accordance with ISO 2846-1 on APCO III/II (●●).

European experts in the 60s. By the end of the 80s it had become clear that the colours of process inks had changed in relation to the values specified in ISO 2846 and DIN 16539 as a result of market demands. The resulting revision was based on data from Europe, the USA and Japan.

Experts from ISO TC 130 Graphic Technology came to the conclusion that a single set of colour values could represent the proposals from around the world within reasonable tolerances. There was also agreement over further changes and extensions to the original standard such as the inclusion of black, a new measure for transparency and consequently the elimination of the secondary colour specifications, and, finally, the inclusion of radiation curing inks.

The "European Colour Scale for offset printing" (DIN 16539) or often called "Euroscale" is now no longer significant and has been withdrawn. Nevertheless, the term "Euroscale" is still

going around. However, awareness of the new ISO 2846-1: 1997 colour standard is gradually increasing amongst major customers and printers.

ISO Scale available everywhere

According to the German Printing Ink Industry Association, 80 % of the process inks supplied today, within the given tolerances, comply with the specifications of the new colour standard. Nevertheless there are deliberate exceptions and colour deviations in order to achieve special effects or to meet specific customer wishes. Furniture brochures, for example, should appear warmer, whilst computer or car brochures should be cooler. Therefore, in the first case, a warmer yellow and cyan are chosen. A warmer yellow in particular is favoured in Europe. The higher colour strength of the more reddish yellow is, however, only simulated visually. Such an attempt to influence the

character of the printed image in the press room by altering the colour of the ink does not make much sense. Such changes should continue to be made at the prepress stage when, with the help of colour management, they can be controlled better.

Tolerances

Although the ISO standard brings process colours under one roof world wide, differences in taste between different regions continue to exist. These are expressed by the preference in the Far East and the USA for colder and in Europe for warmer colours. However, such differences lie within the relatively generous tolerances given in the standard.

Given the globalization of companies and the associated exchange of data and colour management profiles, it is to be expected that the International Standards will also have an educational effect and drive forward uniformity in the long term. At present we can start on the assumption that inks tailored to the target values of ISO 2846-1 can be supplied on demand world wide. Although it will take more time for volume business to be built up in some other regions than in Europe, there can be no doubt as to the train's destination given the way the points are set.

The primary colours specified in the standard are designed to be feasible, of course, by which is meant the commercial availability of light fast and chemical resistant pigments that also offer good processing properties. This is, for example, not true of the "cold DIN Scale" (DIN 16509), which allows a larger colour gamut to be achieved but some of whose pigments have very low fastness. On this point I'd like to mention that the

frequently expressed wish today for a redder yellow together with a redder magenta clearly limits the colour gamut that can be achieved in the green area.

Colour gamut

Once again, it must be emphasized that the colour values in the ISO 2846-1 colour standard were not based on production run prints. As can be seen from figure 1, the colour coordinates of the primary colours on APCO II/II reference paper deviate only slightly from those on type 1 print run paper but on uncoated paper (type 4) the deviations are clear. If, as a trial, the colour values of the colour standard are realized in a production run on a print run paper the result will not be a success because these values are exclusively designed for laboratory printing on the reference paper. Incidentally, this also applied to the colours specified in DIN 16539 (European Colour Scale) and/or ISO 2846: 1975. For production printing it is the colour values specified in the process standard (ISO 12647-2) that should be achieved within the tolerances specified therein when process inks that comply with the colour standard

(ISO 2846-1) are printed on a print run paper type listed in the process standard.

What is not to be expected from the colour standard?

Only the colour properties of the solid process inks are specified in the colour standard. However, in practice solids are relatively seldom printed. Most printing is of halftones, where the colour is determined not just by the colour properties of the solid ink but to a large extent by the dot gain. Consequently a common desire is that the dot gain due to the ink should be specified in the colour standard.

Although the inks and their printing properties have a not insignificant influence on dot gain, its magnitude is not entirely determined by the ink. It must always be considered in conjunction with the materials used and the press conditions, which exert a significant influence on dot gain.

Even if one tries to give the ink properties that ensure an "ideal dot gain", as determined in one's own printing plant or by customers using identical materials; printing with the same ink in different print

houses, under the specific printing conditions applying there may result in changes to the dot gain. Even with the same paper, the dot gain can change during a run due to fluctuations in the paper coating properties. The storage of the inks is frequently associated with changes in their rheological properties (thickening) which can result in dot gain changes even under the same printing conditions. Consequently, printers should ensure that inks that have been stored for very different lengths of time should not be used together. The desire for a dot gain specification for the ink to be included in a data sheet or in a standard in the same way as the colour is therefore not feasible for technical reasons.

Every ink manufacturer gears its production to the available raw materials, their prices and the own manufacturing conditions. He strives to produce a product that meets his customers requirements as closely as possible. Colour, running properties, drying behaviour and finishing are amongst the most important aspects. However, this does not mean that a process ink uses the same formula or is produced under the same conditions in all companies. These differences can have a noticeable influence on the consistency and the dot gain associated with it. Figure 2 shows two extreme examples of differing consistency. Fortunately the printer is not helplessly at the mercy of these ink properties, they can be compensated for through the choice of various materials (blanket, dampening solution, paper) and the settings of the press parameters (printing pressure, dampening control) in the event of too great or too small a dot gain.

Ink acceptance in wet on wet printing has a strong effect on the printed image and it in turn is significantly affected by the



Fig. 2: Examples for different consistency of offset inks.

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properties of the ink, particularly its tack, which is strongly influenced by the offset dampening. Significant factors include the setting properties of the ink and paper as well as the printing speed, which determines the time interval for setting before the next colour is printed. Setting is of major importance in relation to this since it results in the separation of the low viscosity components of the ink being by the capillary effect of the paper coating, thus increasing the tack of the of ink layer printed first, which improves the acceptance of the ink printed second.

Here again it is clear that the various influences originating from different sources prevent the trapping of an offset ink from being specified or laid down in the colour standard. The consequence of this is that the normal approach must be followed to achieve stan-

dardized printing: print a test forme – measure the test forme – prepress adjustments (colour management).

The colour tolerances included in the ISO 12647-2 process standard for production printing are designed to allow standardized production in the face of the fluctuations in ink supply and dot gain that occur under normal print conditions. The unavoidable effects of adjustments to the press settings such as printing speed or inking or dampening control and the consequent alterations in the ink-water balance as well as changes in the press temperature inevitably lead to fluctuations in dot gain, colour density and colour. The demand for tighter tolerances than in ISO 12647-2 is therefore not compatible with the technical realities of offset printing.

Colour standard for ink manufacture

Finally, it must be pointed out that in the first instance the printer is not directly addressed by the colour standard (ISO 2846-1), rather it is the manufacturer that produces and supplies the ink with which the colours specified in the process standard (ISO 12647-2) can be achieved. Ultimately, however, the solid colours of the new version of the ISO 12647-2 process standard the revision of which is currently being finalized, those of the "offset printing process standard" of the German Printing and Media Industries Federation, the FOGRA characterization data for colour management, as well as the ECI ICC profiles are all based on ISO 2846-1 inks. On this basis, it should be possible for the printer to print from colour separations that are based on the ISO Colour Scale and accompanied with adjusted ICC profiles and to achieve colours that are true. This also means that test prints produced in accordance with ISO 2846-1 are not of any real use to printers.

MASTHEAD

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