

Description

This invention relates to colour printing and it is a general object of the invention to assist the designer in making an original colour determination and also to assist the printer in obtaining accurately controlled colour in the final printed product.

Existing colour printing procedures suffer from many problems and limitations. It is extremely difficult to control accurately the hue and tone of the final printwork and it is also difficult to relate the final printwork exactly to the specification or art-work from which it derives. This creates serious problems for the printer and different though equally serious problems for the designer or artist.

The problems exist in most types of colour printing but the present invention is particularly though not exclusively applicable to coloured layouts or art-work which include areas of a single uniform colour commonly known as "tints".

For convenience in this specification the following terms are used with the specified meanings:

Tone - The visual colour appearance of an object or surface to the human eye, whether it relates to original graphic art, a colour photograph, a coloured ink, or coloured print-work. Tone relates to the frequency and wavelength of light.

Tint - Variations in the intensity of colour ranging from a shallow near-white version of the colour to the deepest possible tint of the same colour. "Tint" concerns variations in the appearance of a single or multiple colour brought about by printing smaller areas of such colours, usually by use of "dot screens". The word "tint" may also refer to larger areas of a uniform or graduated colour.

Complimentary Colours - The three colours (usually cyan, yellow and magenta) used in colour printing to provide the full range of colours across the whole visible spectrum.

One well known existing process for printing "flat" coloured areas or "tints" is to use so called "line colours". Known as "line printing" this involves printing with inks of any colour, including tints of those colours, using mechanical screens. These inks are commercially available from a number of sources and consist essentially of eight or more standard coloured inks, which can be selected by the designer or printer from specimen charts to generate final print-work conforming hopefully to any colour on the chart. The chart contains detailed instructions for mixing the inks in varying proportions to produce any selected colour on the chart. Difficulties which occur are numerous. The coloured inks available to the printer may not correspond exactly with the colours of the specimen charts, and the printer may have great difficulty in mixing up ink combinations exactly to the specified combination figures.

Another widely used colour printing process uses three specified "process colours" printed in

varying tint, combinations, based on the well known triple "primary colour" effect. Theoretically each process colour is a mixture of two primary colours, and is deficient in the third primary. The "process" colours are magenta, cyan and yellow, and are "complementaries" of the three optical "primaries" (green, red, and blue), and can be combined at different individual tint values to give a very wide colour range. The final visual tone or colour is controlled by inserting a pre-printed grid screen in the optical path when preparing the individual colour litho plates, each screen having a pre-printed pattern of small opaque areas (referred to hereinafter for convenience as "dots" though any other pattern of areas may suffice) which combine to obstruct a specified percentage of light. Thus a 10% screen produces a very light tint and a 50% screen produces one half of the full tint.

In this "process colour" system the tints of the three process colours, which are vital to the appearance of the final print-work, are governed partly by the performance of the grid screens used in the photographic preparation of the litho plates for the final printing. These grid screens may be specified in percentage terms or by the number of dots or lines to the inch, but these definitions are not sufficient to govern the screen effect fully and screens can vary appreciably when supplied from different sources. Problems also arise in printing due to "dot shrinkage", and "dot growth", problems which are well known to colour printers and extremely difficult to eliminate or control. A further problem arises from so called "Moiré fringe pattern" effects which cause unsightly repeating patterns in certain combinations as will be explained in more detail below.

Another serious problem in existing process colour systems is the difficulty in making a colour choice. Since no samples are available the designer must either attempt to describe a tone in words, or select a sample of the appropriate tone from some other coloured materials. The printer then by a combination of skill, experience and guesswork produces a specimen tone, by making an arbitrary selection from the available combinations. Assuming that he has available 9 different "percentage screens" (10%, 20% ... 90%) with three process colours, and black as an extra, the total number of possible tones theoretically available will be many thousands. Some of these may have to be rejected for reasons other than colour match, but the choice is in practice too wide for practical convenience. The result often is that the proofing sheets are not acceptable to the designer, and the printer is forced to repeat the whole selection procedure.

Broadly stated from one aspect the invention consists in a kit for use in preparing and printing coloured art work by process colours, comprising a collection of small pre-printed reference colour areas each representing, a different reference "tint" in the final colour printing, and each printed from selected combinations of three standard process colours, with optional black, at selected

percentage densities, characterised in that the reference areas are arranged in identifiable groups (A, B, C, etc) with all the areas in any one group (ABC) being printed from colours each at a uniform selected percentage density within the group, but varying combinations of the available process colours and black, and each of the areas identified by a reference index. Preferably the small reference "tints" are arranged in sub-groups identifiable with reference to particular selections and combinations of process colours, with black, and more conveniently the reference "tints" are arranged in orthogonal rows and columns of which one represents selected percentage densities, while the other represents selected combinations of process colours, with optional black. Since the visual appearance can vary appreciably with different surface textures the reference "tints" are preferably printed on to a plurality of different surface qualities.

The presence of Moiré patterns is objectionable and hitherto was very difficult to eliminate, but according to another preferred feature of the invention the elimination is applied, before the reference "tints" are grouped: in other words substantially all the "tints" are free of Moiré patterns.

The invention enables the number of "tints" to be reduced very effectively and preferably there are less than 500, and possibly not more than 300, different "tints" all distinguishable from each other.

In any case, the kit includes or is associated with means to identify the standard process colours adopted for the "tints" and for the final printwork. There should also be means to identify the shapes, patterns and densities of the dots or other shapes in the percentage density screens, and line spacing and angle.

The invention also consists in a method of creating coloured art work from a kit as defined, in which tones are selected from solid reference "tints" and areas from the said corresponding cut-out tints are cut out to build up the art work, and in which the final colour reproduction printwork is produced using percentage screens and process colours exactly as identified by the reference index for each selected tint of the art work.

Furthermore, the invention from another aspect also consists in a method of producing colour printwork from a graphic colour layout created by the method described, in which standard process colours are selected as specified in said kit, selected percentage screens for the individual process colours are selected or generated from the groupings of said reference tints, colour litho plates are created photographically by use of such screens, or an equivalent digital scanning system, and the final colour printing is performed on the same selected surfaces as specified in said kit and using exactly the same specified printing parameters.

It has been proposed in U.S.-A-1597830 to provide a colour chart and index for use in colour printing by process colours. The principle

involved was that each column or row of the chart was formed from the three process colours, two of the colours being of constant density along the whole length of the row while the density of the third colour varied progressively from one end to the other. There was no suggestion in this patent of placing the reference areas in groups with all the colours printed at the same density within the group. Furthermore there was no suggestion of varying the reference areas simply by omitting one or two or more of the process colours from different areas within the group.

It has also been proposed, for example in, U.S.-A-3434227, to provide colour printing charts in which the different reference areas are printed in "line colours". As explained above this involves printing with mixtures of different printing inks and the problem and advantages are entirely different from colour printing by "process colours".

From another aspect the invention consists in a colour matching kit of the type referred to in which the reference areas are arranged in identifiable groups all the printed areas in each group being printed by use of the selected process colours with optional black, different areas having different ones of said process colours and black omitted.

The invention also resides in coloured printwork produced by means of a kit or process as defined.

The invention may be performed in various ways and one specific embodiment with a number of possible modifications will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is a conventional colour diagram illustrating the relationship between primary colours and corresponding process colours,

Figures 2(a), 2(b) and 2(c) are magnified views illustrating three photographic grid screens of different percentage tint values, and with the screens oriented at different angles,

Figures 3(a), 3(b), 3(c) and 3(d) illustrate to a greater magnification some of the many possible shapes and patterns of dots on the screens,

Figure 4 illustrates on an enlarged scale one form of "Moiré pattern", which may result from overlapping dot screens, and

Figure 5 illustrates on a reduced scale a chart of preprinted sample coloured tints for use in the invention.

The system relies on standardisation of a number of vital elements in the overall procedure. At the outset a range of carefully selected tints are produced using three selected "process colours", and black, and the same tints are also printed on large sheets for use by the graphic artist.

Figure 1 merely illustrates diagrammatically the optical relationship between three primary colours R (Red), G (Green) and B (Blue) and the three complimentary process colours Y (Yellow), M (Magenta), C (Cyan). Each process colour is a compliment of the opposed primary and in theory each process colour is a mixture of the other two

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primaries and deficient in the third primary. Various different International standards are well established to identify process colours and it is sufficient for the purposes of this invention that the particular standard selected should be identified. Process colours obtained from any reliable source can then be guaranteed to conform to the specification. In preparing the printed tints from the three process colours, and black, an optical screen is used to adjust the density. The screen normally consists of a pattern of dots or other shapes and the control effect is governed by a number of variables. Firstly, there is the shape of the individual dots or other shapes. Four examples are illustrated in Figures 3(a) to 3(d), Figure 3(a) illustrating square dots, Figure 3(b) round dots, Figure 3(c) pincushion dots, and 3(d) parallel lines. There are many other possible shapes and patterns that may be employed and it is important that the particular selected pattern should be identified and specified.

Secondly, it will be seen that the dot patterns normally present themselves in rows or lines and it is important to specify the angular direction or orientation of these rows. Significant differences in the printed product result from changes in this angular adjustment.

Thirdly, the dot screens are selected in accordance with the overall density of the black dots or lines in relation to the clear background of the screen. This density may be referred to as the "percentage value" and three examples are illustrated in Figures 2(a) to 2(c) where Figure 2(a) represents, for example, 5%, Figure 2(b) 10%, Figure 2(c) 15%. It will be noted in the same Figures that the angular orientation of the rows of dots is different between the different Figures.

One of the problems encountered in combining dot screens for multi-colour printing is that occasionally the screens interact to generate an unwanted further effect known as a Moiré pattern. A typical example is illustrated in Figure 4 which shows two plain round dot screens overlapping and generating a rectangular Moiré pattern at the overlap. Where this occurs it is important that steps should be taken to remove it and the invention achieves this very simply.

The kit provided in accordance with the invention for use by a graphic artist consists of three colour chart sheets each in the form illustrated in Figure 5, together with a number of larger sheets each printed overall with one of the tints shown on the charts.

Referring first to Figure 5, the chart is organised in twelve vertical columns and six horizontal rows. The vertical columns 1 to 12 each define a selection or combination of the three process colours with black and in the present example these vertical columns are identified as follows:-

1. 4 Colours
2. Minus Black
3. Minus Magenta
4. Minus Cyan
5. Minus Yellow
6. Minus Black & Magenta

7. Minus Black & Cyan
8. Minus Black & Yellow
9. Minus Cyan & Magenta
10. Minus Cyan & Yellow
11. Minus Magenta & Yellow
12. Single Colours

Each of the horizontal rows is identified with a particular combination of percentage screens and in the present example these are selected as follows:-

- A = 35% C (Cyan), 75% M (Magenta)
60% Y (Yellow), 50% Black.
- B = 60% C, 80% M, 75% Y, 50% Black.
- C = 75% C, 85% M, 80% Y, 50% Black.
- D = 80% C, 35% M, 85% Y, 50% Black.
- E = 85% C, 60% M, 35% Y, 50% Black.

The horizontal row S is differently organised. The first two squares under columns 1 and 2 are sub-divided into halves and each represents a 100% tint of one of the three process colours, with black as the fourth. The next 3 squares under columns 3, 4 and 5, represent 100% tints of two colour combinations from the three process colours. The next six squares under columns 6 to 11 represent a 100% tint of one of the process colours with 50% Black, followed by a two colour tint of two process colour combinations with 50% Black. The final square under column 12 represents 50% Black without process colour.

In the vertical column 12 each square is sub-divided into three and each of these represents one of the process colours printed at the percentage value indicated for the corresponding horizontal row, without other colours or black.

Each one of the squares throughout the chart is identified by a reference number printed below the square and there may be a total of three charts each with 84 tint areas making a combined total of 252.

Additionally each sheet of the charts or kit identifies the type of dot shape and dot pattern used, as explained above with reference to Figures 2 and 3, the percentage values of the screens of course being indicated to the left of the chart as pointed out above. The particular standard process colours used in printing the charts are also identified so that precisely the same process colours can be selected and used in a final printing.

In preparing the charts particular attention is paid to the presence of any undesirable Moiré patterns. If it is found that these occur from any combination of the different percentage screens then the choice of percentages is readjusted to eliminate any tint with the Moiré pattern. This is a time consuming operation initially, but once the charts have been prepared this then totally eliminates Moiré patterns from all resultant print-work a very great saving in time to the printer.

It will be understood that with ten or more possible percentage screens available between 0% and 50% a very large number of possible combinations and corresponding tints can be produced from the three process colours with Black. The total number is in fact far in excess of

what is needed by any graphic artist and furthermore the total range generates many tints which are almost identical with other tints in the range. Therefore, in selecting the percentages for the horizontal rows in the three charts very careful attention is given to eliminating tints which are practically identical with others thus providing the maximum possible choice within a compact selection.

A very important aspect of this system is that all the tints in any one horizontal row can be produced by the printer using only the one set of percentage dot screens shown to the left of that row. Therefore, if the graphic artist is willing to confine his selection to one row or to a small number of rows the printer's task is greatly facilitated and great economies can be effected in printing costs.

The appearance of colour printwork varies appreciably with the quality of the surface on which the colours are printed and to provide the graphic artist with a ready gauge for this variable factor the three charts may be reprinted on two or three different types of surface such as art paper, mat paper and "laminated" paper, i.e. with a thin plastic overlay or skin.

In use the graphic artist first selects the quality of paper and the appropriate group of three charts and then selects from these charts the particular tint or tints required for the particular colour printwork. Preferably the selected tints will all lie in one horizontal row, but that is not essential, as explained above. Having identified the tints the artist then picks out corresponding sheets from the large preprinted tint sheets provided in the kit and then in the normal way by use of scissors and glue builds up the initial colour layout. If the artist finds that any of the tints conflict it is a simple matter to select another tint from the chart and cut out a corresponding area from the respective tint sheet provided in the kit. After the initial art layout has been approved it is then handed to the colour printer with an identification of each of the colour tint zones derived from the reference numbers printed below the individual squares on the charts.

Each of these reference numbers then identifies for the colour printer exactly what percentage screens to use and which of the process colours are to be applied. There is absolutely no question of the printer having to match colours and tints and no Moiré fringe problem can arise. If the selection of tints is all in one horizontal row the printer only needs to use the four specified dot screens and it becomes a question merely of colour combinations to select.

In the actual printing process there are a number of variable factors which can be adjusted in addition to the factors specified above which may be referred to as the variable tint selecting factors. The remaining factors may be standardised and the kit preferably includes instructions to the colour printer how to adjust or set these standard factors. This may apply, for example, to the factors which control "dot gain". In "printing

down" to produce the litho plate there is normally a small reduction in dot size but when "printing up" in the final printing operation there is a marked increase in dot size referred to as "dot gain". This is a variable effect which is difficult to control and can be altered by a number of different factors. In performing the present invention some of these factors can be specified to the printer and others can be included and determined within the system. In one respect the system provides automatic dot gain control. By using the very same grid screens and the same process colours and controlled temperatures, printing pressures, and other normal printing parameters, such as choice of blanket rollers and "nip pressure", the sample tones are produced under substantially the same printing conditions as the final printwork. Thus dot gain for example will have substantially the same effect on the sample tones as in the final printwork.

The photographic grid screens used in process colour systems may be replaced by an electronic scanning process, which is known in itself and requires no detailed description. The electronic scanner is programmed to generate the required screen pattern digitally and directly on to the film instead of through the medium of the normal, photographic grid contact screens. Digital electronic scanning can also be used in the present invention to replace the use of photographic grid screens. In one possible procedure programmes are prepared and retained in the electronic memory corresponding to the different "percentage screens" required for a particular system. These programmes can then be recovered instantly and used for preparing the initial pre-printed tones and in the final colour printing stages.

As explained, this invention provides a very adequate selection of possible tones without the vast numbers found in some colour charts. In practice it is found that an adequate range can be produced by careful selection with less than 500, and preferably less than 300, individual tints. If any nearly duplicated tints are eliminated, and also any tint with a Moiré pattern, a full colour range is available.

Another factor affecting the final product is the line spacing or dot spacing of the percentage screens and this also needs to be specified in the kit. In some cases a graduated tint of varying density across the printed area is required and this also can be achieved by specifying the graduation and providing additional reference tints and cut-out tints accordingly.

The actual process colours used in carrying out the invention should preferably be very exactly specified, as explained above, and one satisfactory definition is found in the specification for litho inks found in British Standard No. 4666, or the corresponding D.I.N. Standard, which identifies the colours by reference to the colour spectrometer reading, checked against a colour reference held by the Printing Industry Research Association of Randall's Road, Leatherhead,

Surrey. For this the colours are printed in ink one micron thick on Abco II white coated paper.

A variety of different percentage screens may be used, but one particular preferred screen has a line ruling of 150 lines per inch, with round dots, generated digitally on an electronically controlled scanner produced by Crosfield Electronics Limited, of Holford Road, London.

Claims

1. A colour matching kit for use in preparing and printing coloured art work by process colours, comprising a collection of small pre-printed reference colour areas each representing a different reference "tint" in the final colour printing, and each printed from selected combinations of three standard process colours, with optional black, at selected percentage densities, characterised in that the reference areas are arranged in identifiable groups (A, B, C, etc) with all the areas in any one group (ABC) being printed from colours each at a uniform selected percentage density within the group, but varying combinations of the available process colours and black, and each of the areas is identified by a reference index.

2. A kit according to Claim 1, characterised in that the small pre-printed reference areas are arranged also in sub-groups (1, 2, 3, etc) identifiable with reference to particular selections and combinations of process colours, with optional black.

3. A kit according to Claim 1 or Claim 2, characterised in that the reference areas are arranged on charts (Fig. 5) in orthogonal rows (A, B, C, etc) and columns (1, 2, 3, etc), of which one (A, B, C) represents selected percentage densities, while the other (1, 2, 3) represents selected combinations of process colours, with optional black.

4. A kit according to any of the preceding claims, characterised in that the reference areas are printed on two or more different surface qualities.

5. A kit according to any of Claims 1 to 4, characterised in that the reference areas are printed by means of screens, and the reference areas are selected to exclude any area suffering from Moiré patterns.

6. A kit according to any of the preceding claims, characterised in that there are not more than 500 different reference areas all distinguishable from each other.

7. A kit according to any of the preceding claims, characterised by means to identify the particular standard process colours adopted for the reference areas and for the final printwork.

8. A kit according to any of the preceding claims, characterised by means to identify the shapes, patterns and densities of the dots or other shapes in the percentage density screens.

9. A kit according to any of the preceding claims, characterised in that the reference areas are printed on charts which also carry extra

printed reference areas printed from the selected process colours with optional black, each to a uniform density within the respective group, but at an overall density combination different from other groups.

10. A kit according to any of the preceding claims, characterised in that each of the said groups comprises areas printed by the selected process colours at the said uniform selected density within each group, the said printed areas within each individual group having different ones of said process colours omitted.

11. A kit according to any of Claims 1 to 9, characterised by additional larger pre-printed colour areas corresponding closely in tone to the smaller reference areas.

12. A kit for use in preparing and printing coloured art work by process colours, comprising a collection of small pre-printed reference colour areas each representing a different reference "tint" in the final colour printing, and each printed from selected combinations of three standard process colours, with optional black, at selected percentage densities, characterised in that the reference areas are arranged in identifiable groups all the printed areas in each group being printed by use of the selected process colours with optional black, different areas having different ones of said process colours and black omitted.

13. A method of creating coloured art work using a colour matching kit according to any of Claims 1 to 12, characterised in that tones are selected from the reference areas, and the final colour reproduction printwork is produced using percentage screens and process colours exactly as identified by the reference index for each selected reference area.

14. A method of producing colour printwork by means of a kit according to Claim 11, characterised in that for the final colour printing, standard process colours are selected as specified in the kit, selected percentage screens for the individual process colours are selected or generated from the groupings of the reference areas, colour litho plates are created photographically by use of such screens, or an equivalent digital scanning system, and the final colour printing is performed on the same selected surfaces as specified in the kit and using exactly the same specified printing parameters.

15. A method according to Claim 14, when dependent from Claim 13, characterised in that portions are cut out from selected ones of the larger pre-printed sheets, and used to build up the initial art work, before final colour printing.

16. Coloured printwork when produced by means of a kit or a process as defined in any of the preceding claims.

Patentansprüche

1. Tafel zur Abstimmung von Farben für die Herstellung und den Druck farbiger Kunstwerke unter Verwendung von Druckprozeßfarben,

Surrey. For this the colours are printed in ink one micron thick on Abco II white coated paper.

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2. A kit according to Claim 1, characterised in that the small pre-printed reference areas are arranged also in sub-groups (1, 2, 3, etc) identifiable with reference to particular selections and combinations of process colours, with optional black.

3. A kit according to Claim 1 or Claim 2, characterised in that the reference areas are arranged on charts (Fig. 5) in orthogonal rows (A, B, C, etc) and columns (1, 2, 3, etc), of which one (A, B, C) represents selected percentage densities, while the other (1, 2, 3) represents selected combinations of process colours, with optional black.

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printed reference areas printed from the selected process colours with optional black, each to a uniform density within the respective group, but at an overall density combination different from other groups.

10. A kit according to any of the preceding claims, characterised in that each of the said groups comprises areas printed by the selected process colours at the said uniform selected density within each group, the said printed areas within each individual group having different ones of said process colours omitted.

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Patentansprüche

1. Tafel zur Abstimmung von Farben für die Herstellung und den Druck farbiger Kunstwerke unter Verwendung von Druckprozeßfarben,



bestehend aus einer Zusammenstellung von kleinen vorgedruckten farbigen Bezugsflächen, von denen jede eine unterschiedliche Bezugstönung in dem fertigen Farbdruck hat und von ausgewählten Kombinationen der drei Standard-Druckprozeßfarben und gegebenenfalls Schwarz bei ausgewählten prozentualen Farbdichten gedruckt ist, dadurch gekennzeichnet, daß die Bezugsflächen in identifizierbaren Gruppen (A, B, C usw.) angeordnet sind, wobei alle Bereiche in jeder einzelnen Gruppe (A, B, C usw.) aus Farben gedruckt sind, von denen jede eine übereinstimmende ausgewählte prozentuale Dichte innerhalb der Gruppe, jedoch unterschiedliche Kombinationen der vorhandenen Druckprozeßfarben und Schwarz aufweist und jeder der Bereiche durch einen Bezugsindex gekennzeichnet ist.

2. Tafel nach Anspruch 1, dadurch gekennzeichnet, daß die kleinen vorgedruckten Bezugsflächen ebenfalls in Untergruppen (1, 2, 3 usw.) angeordnet sind, die in bezug auf die besondere Auswahl und Kombination der Druckprozeßfarben und gegebenenfalls Schwarz identifizierbar sind.

3. Tafel nach den Ansprüchen 1 oder 2, dadurch gekennzeichnet, daß die Bezugsflächen auf Karten in rechtwinklig zueinander verlaufenden Reihen (A, B, C usw.) und Spalten (1, 2, 3 usw.) angeordnet sind, von denen eine (A, B, C usw.) bestimmte prozentuale Farbdichte und die andere (1, 2, 3 usw.) ausgewählte Kombinationen von Druckprozeßfarben, gegebenenfalls mit Schwarz darstellt.

4. Tafel nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Bezugsflächen auf zwei oder mehrere Oberflächen mit unterschiedlicher Qualität gedruckt sind.

5. Tafel nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß die Bezugsflächen mit Hilfe von Rastern gedruckt sind und daß die Bezugsflächen so ausgewählt sind, daß Bereiche mit Moiré-Mustern ausgeschlossen sind.

6. Tafel nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, daß nicht mehr als 500 verschiedene, voneinander unterscheidbare Bezugsflächen vorgesehen sind.

7. Tafel nach einem der vorhergehenden Ansprüche, gekennzeichnet durch Mittel, mit denen die besonderen Standard-Druckprozeßfarben identifizierbar sind, die für die Bezugsflächen und den fertigen Druck vorgesehen sind.

8. Tafel nach einem der vorhergehenden Ansprüche, gekennzeichnet durch Mittel zum Identifizieren der Gestalt, der Muster und der Dichten der Punkte oder dergleichen in den verschiedenen, die prozentuale Dichte bewirkenden Rastern.

9. Tafel nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Bezugsflächen auf Karten gedruckt werden, die auch extra ausgedruckte Bezugsflächen enthalten, die mit den ausgewählten Prozeßdruckfarben und gegebenenfalls Schwarz, jede bei einer übereinstimmenden Dichte innerhalb der entsprechenden Gruppe, aber einer von ande-

ren Gruppen abweichenden Gesamtdichtekombination gedruckt sind.

10. Farbtafel nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß jede der Gruppen Flächen enthält, die bei der übereinstimmenden ausgewählten Dichte innerhalb jeder Gruppe mit den ausgewählten Druckprozeßfarben gedruckt sind, wobei bei den gedruckten Flächen innerhalb jeder einzelnen Gruppe unterschiedliche Druckprozeßfarben weggelassen sind.

11. Farbtafel nach einem der Ansprüche 1 bis 9, gekennzeichnet durch zusätzliche größere vorgedruckte farbige Flächen, die in ihrer Tönung genau den kleineren Bezugsflächen entsprechen.

12. Farbtafel zur Herstellung und zum Druck farbiger Kunstgegenstände mit Druckprozeßfarben, die eine Zusammenstellung von kleinen vorgedruckten farbigen Bezugsflächen enthält, von denen jede eine unterschiedliche Bezugstönung in dem farbigen Farbdruck darstellt und von ausgewählten Kombinationen von drei Standard-Druckprozeßfarben und gegebenenfalls Schwarz bei ausgewählten prozentualen Farbdichten gedruckt ist, dadurch gekennzeichnet, daß die Bezugsflächen in identifizierbaren Gruppen angeordnet sind, wobei alle gedruckten Flächen in jeder Gruppe unter Verwendung der ausgewählten Druckprozeßfarben und gegebenenfalls Schwarz gedruckt sind und bei unterschiedlichen Flächen unterschiedliche Prozeßfarben bzw. Schwarz fehlen.

13. Verfahren zur Herstellung von farbigen Kunstwerken unter Verwendung einer Farbtönungstafel gemäß einem der Ansprüche 1 bis 12, dadurch gekennzeichnet, daß die Farbtönungen aus den Bezugsflächen ausgewählt werden und das fertige reproduzierte farbige Druckwerk in der Weise hergestellt wird, daß prozentuale Raster und Druckprozeßfarben benutzt werden, wie sie genau durch den Bezugsindex für jede ausgewählte Bezugsfläche identifiziert sind.

14. Verfahren zur Herstellung von farbigen Druckwerken mittels einer Farbtönungstafel gemäß Anspruch 11, dadurch gekennzeichnet, daß für den endgültigen Farbdruck Standard-Druckprozeßfarben ausgewählt werden, die in der Farbtafel spezifiziert sind, daß ausgewählte prozentuale Raster für die einzelnen Druckprozeßfarben von den Gruppen der Bezugsflächen ausgewählt oder erzeugt werden, daß farbige Lithoplaten photographisch durch Verwendung derartiger Raster oder ein äquivalentes digitales Rastersystem hergestellt werden und daß der endgültige Farbdruck auf den gleichen ausgewählten Oberflächen vorgenommen wird, wie er in der Farbtafel spezifiziert ist und genau die gleichen spezifizierten Parameter für den Druck benutzt werden.

15. Verfahren nach den Ansprüchen 13 und 14, dadurch gekennzeichnet, daß von den ausgewählten größeren vorgedruckten Blättern Teile ausgeschnitten und dazu benutzt werden, das anfängliche Kunstwerk vor dem endgültigen Farbdruck aufzubauen.

16. Farbiges Druckwerk, das mittels einer Farb-



tafel oder eines Verfahrens gemäß einem der vorhergehenden Ansprüche hergestellt ist.

Revendications

1. Ensemble d'échantillonnage chromatique destiné à être utilisé pour la préparation et l'impression d'oeuvres d'art en couleurs à l'aide de couleurs de traitement, comportant un assortiment de petites zones de couleur de référence préimprimées correspondant chacune à une "teinte" de référence différente de l'impression en couleurs finale, et respectivement imprimées à partir de combinaisons sélectionnées de trois couleurs de traitement standard, le noir étant facultatif, suivant des pourcentages de densité sélectionnés, caractérisé en ce que les zones de référence sont disposées en groupes identifiables (A, B, C, etc.), toutes les zones d'un groupe quelconque (ABC) étant imprimées à partir de couleurs présentant chacune un pourcentage de densité sélectionné homogène à l'intérieur du groupe, mais des combinaisons variables des couleurs de traitement disponibles et du noir, et en ce que chacune des zones est identifiée par un indice de référence.

2. Ensemble selon la revendication 1, caractérisé en ce que les petites zones de référence préimprimées sont également disposées en sous-groupes (1, 2, 3, etc.) identifiables par référence aux sélections et aux combinaisons particulières de couleurs de traitement, le noir étant facultatif.

3. Ensemble selon la revendication 1 ou 2, caractérisé en ce que les zones de référence sont disposées dans des tableaux (Fig. 5) en rangées (A, B, C, etc.) et en colonnes (1, 2, 3, etc.) orthogonales dont les unes (A, B, C) correspondent à des pourcentages de densités sélectionnés, tandis que les autres (1, 2, 3) correspondent à des combinaisons sélectionnées de couleurs de traitement, le noir étant facultatif.

4. Ensemble selon l'une quelconque des revendications précédentes, caractérisé en ce que les zones de référence sont imprimées sur deux ou plus de deux qualités de surface différentes.

5. Ensemble selon l'une quelconque des revendications 1 à 4, caractérisé en ce que les zones de référence sont imprimées à l'aide de trames, et les zones de référence sont sélectionnées pour exclure toute zone présentant des motifs moirés.

6. Ensemble selon l'une quelconque des revendications précédentes, caractérisé en ce qu'il existe au maximum 500 zones de référence différentes pouvant toutes être distinguées les unes des autres.

7. Ensemble selon l'une quelconque des revendications précédentes, caractérisé par des moyens pour identifier les couleurs de traitement standard particulières adoptées pour les zones de référence et pour le tirage final.

8. Ensemble selon l'une quelconque des revendications précédentes, caractérisé par des moyens pour identifier les configurations, les motifs et les densités des points ou autres formes des trames de pourcentage de densité.

9. Ensemble selon l'une quelconque des revendications précédentes, caractérisé en ce que les zones de référence sont imprimées sur des tableaux portant également des zones de référence imprimées supplémentaires imprimées à partir des couleurs de traitement sélectionnées, le noir étant facultatif, qui présentent chacune une densité homogène à l'intérieur de leur groupe respectif, mais une combinaison de densités globale différente de celle des autres groupes.

10. Ensemble selon l'une quelconque des revendications précédentes, caractérisé en ce que chacun desdits groupes comporte des zones imprimées à l'aide des couleurs de traitement sélectionnées suivant ladite densité sélectionnée homogène à l'intérieur de chaque groupe, différentes couleurs parmi lesdites couleurs de traitement étant omises dans les zones imprimées à l'intérieur de chaque groupe individuel.

11. Ensemble selon l'une quelconque des revendications 1 à 9, caractérisé par des zones de couleur préimprimées supplémentaires plus grandes dont le ton correspond étroitement à celui des zones de référence plus petites.

12. Ensemble destiné à être utilisé pour la préparation et l'impression d'oeuvres d'art en couleurs à l'aide de couleurs de traitement, comportant un assortiment de petites zones de couleur de référence préimprimées correspondant chacune à une "teinte" de référence différente de l'impression en couleurs finale, et respectivement imprimées à partir de combinaisons sélectionnées de trois couleurs de traitement standard, le noir étant facultatif, suivant des pourcentages de densité sélectionnés, caractérisé en ce que les zones de référence sont disposées en groupes identifiables, toutes les zones imprimées de chaque groupe étant imprimées à l'aide des couleurs de traitement sélectionnées et, facultativement, du noir, différentes couleurs parmi lesdites couleurs de traitement et le noir étant omises dans différentes zones.

13. Méthode pour créer une oeuvre d'art en couleurs à l'aide d'un ensemble d'échantillonnage chromatique selon l'une quelconque des revendications 1 à 12, caractérisée en ce qu'elle consiste à sélectionner des tons à partir des zones de référence, et à produire le tirage de reproduction final en couleurs en utilisant des trames de pourcentage et des couleurs de traitement correspondant exactement à celles identifiées par l'indice de référence pour chaque zone de référence sélectionnée.

14. Méthode pour produire un tirage en couleurs à l'aide d'un ensemble selon la revendication 11, caractérisée en ce qu'elle consiste, pour l'impression en couleurs finale, à sélectionner des couleurs de traitement standard telles que déterminées dans l'ensemble, à sélectionner ou à élaborer des trames de pourcentages sélectionnés pour les couleurs de traitement individuelles à partir des groupements de zones de référence, à créer photographiquement des plaques lithographiques en couleurs à l'aide de ces trames, ou d'un système de balayage numérique



(15)

équivalent, et à réaliser l'impression en couleurs finale sur les mêmes surfaces sélectionnées que celles définies dans l'ensemble, et en utilisant exactement les mêmes paramètres d'impression définis.

15. Méthode selon la revendication 14, lorsqu'elle est dépendante de la revendication 13, caractérisée en ce qu'elle consiste à découper des

parties de feuilles sélectionnées parmi les feuilles préimprimées les plus grandes, et à les utiliser pour composer l'oeuvre d'art initiale, avant l'impression en couleurs finale.

5 16. Tirage en couleurs produit à l'aide d'un ensemble ou d'un procédé tel que défini dans l'une quelconque des revendications précédentes.

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