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**Datasheet for the decision  
of 13 September 2007**

**Case Number:** T 0435/05 - 3.4.02

**Application Number:** 00964276.0

**Publication Number:** 1218706

**IPC:** G01J 3/52

**Language of the proceedings:** EN

**Title of invention:**

Methods for colour matching by means of an electric imaging device

**Applicant:**

Akzo Nobel Coatings International B.V.

**Opponent:**

-

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Inventive step - main and auxiliary requests - (no)"

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 0435/05 - 3.4.02

**D E C I S I O N**  
of the Technical Board of Appeal 3.4.02  
of 13 September 2007

**Appellant:** Akzo Nobel Coatings International B.V.  
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NL-6824 BM Arnhem (NL)

**Representative:** Schalkwijk, Pieter Cornelis  
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**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted 24 November 2004  
refusing European application No. 00964276.0  
pursuant to Article 97(1) EPC.

**Composition of the Board:**

**Chairman:** A. Klein  
**Members:** M. Rayner  
M. Vogel

## Summary of Facts and Submissions

I. The present appeal lies against the decision of the examining division refusing European patent application number 00 964 276.0 relating to determining colour or texture formula. In the examination and/or appeal proceedings, reference has been made to the following documents:

D2 US-A-5 850 472

D3 US-A-4 813 000

II. According to the decision under appeal, the reason for refusal of the application was that the subject matter of independent claim 1 presented to the examining division could not be considered to involve an inventive step within the meaning of Article 56 EPC. The subject matter claimed differs from the disclosure of document D2 by using a databank to select the most appropriate colour instead of merely comparing colours. However, this is trivial in the art of colour reproduction and its use considered obvious. Use of such methods for formulation is mentioned in the discussion of prior art in document D2. As the main teaching of document D2 gives a solution to the problem of how to measure colour and texture, the skilled person is motivated to use the method described for colour matching. With respect to independent claim 10, the division commented further that its subject matter was not considered to involve an inventive step because documents including document D2 give clear guidance on measuring texture with a colour camera so that its use additional to a spectrophotometer is considered obvious.

III. The appellant requests that the decision under appeal be set aside and that a patent be granted on the basis of the claims according to a main request presented with the appeal, or in the alternative, one of auxiliary requests 1 to 3 filed with the letter dated 27.07.2007 or one of auxiliary requests 4 to 9 filed with the letter dated 11.09.2007. Furthermore, oral proceedings were requested on an auxiliary basis.

The appellant submits that document D2 does not disclose a colour matching method, use of a databank and use of calculated colorimetric data to determine a matching colour. It is not obvious to use a method of comparing samples as disclosed in document D2 as a method for determining a colour formulation by databank searching, because merely mentioning use of colorimeters and spectrophotometers in a teaching concerning quality control does not imply an obvious redesign to colour formulation.

The object of the invention is to find a colour matching method using instruments which are less delicate, less expensive and easier to operate for a user. Document D2 relates to a different problem, namely how to measure complex patterns of appearance (e.g., col. 1, lines 32 -35). Document D1 relates to the problem of improving colour control methods in production processes (col. 2, lines 1 - 8). Neither D1 nor D2 teaches how to solve the problem underlying the present invention. Therefore, independent claim 1 of the main request and the claims dependent therefrom meet the inventive step requirement of Article 56 EPC.

The same holds for independent claim 10. Moreover, where D2 teaches to replace the spectrophotometer by a video camera, claim 10 teaches the contrary. A spectrophotometer or a tri-stimulus meter is used to measure the colour of a sample, while an electronic imaging device is used to determine texture parameters. Further, none of the cited prior art publications disclose any kind of method for texture matching. Hence, claim 10 of the main request, and the claims dependent therefrom, are new and inventive over the cited prior art.

IV. The board appointed oral proceedings consequent to the auxiliary request of the appellant. In a communication attached to the summons, the board expressed its doubts about the chances of success for the appeal, indicating that in the first instance proceedings, document D2 had been treated as the document in the prior art, which is closest to the application. Document D2 already provides an instrument (video camera) which, compared with a spectrophotometer or tri-stimulus meter is less delicate, less expensive and easier to operate for a user. Therefore, contrary to the position of the appellant, this is not the problem addressed by the features of claim 1 identified as novel with respect to document D2; the novel features address the problem of colour formulation for matching. The solution provided, namely using a databank to determine the colour formula which the colorimetric data most closely matches, is well known as stated on page 13 et seq. of the application and as shown, for instance in column 4, line 7 et seq. of document D3. The examining division thus seems correct in its view as to lack of inventive step of the subject matter of claim 1. While the

submission of the appellant that none of the cited prior art publications disclose any kind of method for texture matching may be correct by virtue of the last word, nevertheless document D2 does deal with texture (see column 2, lines 14-18 or column 17, lines 8-12 for example). Both the application and document D2 teach that a video camera should be used in texture processing. Moreover, document D3 also deals with paint matching. Accordingly, subject matter relating to texture matching and car paint formulation (claim 10 and independent claims of the auxiliary requests) would not appear to involve an inventive step. In reading through the description, the board had not really noticed anything which appears to be more than standard colour processing procedures.

- V. Following the summons to oral proceedings, auxiliary requests 1 to 3 were filed, these being amended versions of requests already on file. In a subsequent letter, faxed two days before the oral proceedings, auxiliary requests 4 to 9 were filed. In both cases, the appellant explained where support for the amendments made could be found in the application as filed. No substantive arguments pertaining to inventive step were filed. The independent claims of the current main and auxiliary requests are worded as follows:-

"Main Request (claims unchanged on appeal)

1. Method of determining a colour formula for matching a selected colour measured with an electronic imaging device, which method comprises the following steps:
  - a) an electronic imaging device is calibrated by measuring the colour signals of at least two

calibration colours, the colorimetric data of each of the calibration colours being known;

b) at the same time or in a next step the selected colour is measured with the aid of the electronic imaging device:

c) using a mathematical model, parameters are calculated for converting the measured colour signals of the calibration colours to the known colorimetric data:

d) using the mathematical model and the calculated parameters, the colour signals of the measured selected colour are converted to colorimetric data; and

e) using a databank, the colour formula of which the colorimetric data most closely matches the calculated colorimetric data of the measured selected colour is determined.

10. A method of determining a texture and/or colour formula for matching a selected colour and/or texture of a selected material in which

a) the colour of the selected material is measured with a spectrophotometer or a tri-stimulus meter;

b) the texture of the selected material is measured with an electronic imaging device; and

c) the measured colour and texture data are used to determine, in a databank, the texture and/or colour formula of which the colorimetric data and the texture data most closely match those of the selected material.

#### Auxiliary Request 1

1. Method of determining a car repair paint formula matching a selected colour measured with an electronic imaging device, which method comprises the following

steps:

- a) an electronic imaging device is calibrated by measuring colour signals of at least two calibration colours, the colorimetric data of each of the calibration colours being known;
- b) at the same time the selected colour is measured with the aid of the electronic imaging device;
- c) using a mathematical model, parameters are calculated for converting the measured colour signals of the calibration colours to the known colorimetric data;
- d) using the mathematical model and the calculated parameters, the colour signals of the measured selected colour are converted to colorimetric data; and
- e) using a databank, the car repair paint formula of which the colorimetric data most closely matches the calculated colorimetric data of the measured selected colour is determined.

10. A method of determining a car repair paint formula for matching colour and texture of a selected material in which

- a) the colour of the selected material is measured at at least two different angles with a spectrophotometer or a tri-stimulus meter;
- b) the texture of the selected material is measured with an electronic imaging device; and
- c) the measured colour and texture data are used to determine, in a databank, the car repair paint formula of which the colorimetric data and the texture data most closely match those of the selected material.



Auxiliary Request 2

1. A method of determining a texture and/or colour formula for matching a selected colour and/or texture of a selected material in which
  - a) the colour of the selected material is measured at at least two different angles with a spectrophotometer or a tri-stimulus meter;
  - b) the texture of the selected material is measured with an electronic imaging device; and
  - c) the measured colour and texture data are used to determine, in a databank, the texture and/or colour formula of which the colorimetric data and the texture data most closely match those of the selected material.

Auxiliary Request 3

1. A method of determining a car repair paint formula matching colour and texture of a textured paint of a car to be repaired, the method including the following steps:
  - a) the colour of the original car paint is measured at at least two different angles with a spectrophotometer or a tri-stimulus meter;
  - b) the texture of the paint of the car to be repaired is measured with an electronic imaging device; and
  - c) the measured texture is converted to a coarseness value
  - d) the measured colour and texture data and the coarseness value are used to determine, in a databank, a paint formula with calorimetric and texture properties most closely matching those of the original car paint.

Auxiliary Request 4

Independent claims 1 and 10 are the same as those of the 1st auxiliary request. This request differs from auxiliary request 1 in that dependent claim 12 has been cancelled.

Auxiliary Request 5

Independent claim 1 is the same as that of the 2nd auxiliary request. This request differs from auxiliary request 2 in that dependent claim 6 has been cancelled.

Auxiliary Request 6

Independent claim 1 is the same as that of the 3rd auxiliary request. This request differs from auxiliary request 3 in that dependent claim 6 has been cancelled.

Auxiliary Request 7

The wording of claim 1 is the same as that of claim 1 of the 1st auxiliary request.

10. A method of determining a car repair paint formula for matching colour and texture of a selected material in which

- a) the colour of the selected material is measured with a spectrophotometer or a tri-stimulus meter;
- b) the texture of the selected material is measured with an electronic imaging device; and
- c) the measured colour and texture data are used to determine, in a databank, the car repair paint formula

of which the colorimetric data and the texture data most closely match those of the selected material.

Auxiliary Request 8

The wording of claim 1 is the same as that of claim 10 of the main request.

Auxiliary Request 9

1. A method of determining a car repair paint formula matching colour and texture of a textured paint of a car to be repaired, the method including the following steps;

- a) the colour of the original car paint is measured with a spectrophotometer or a tri-stimulus meter;
- b) the texture of the paint of the car to be repaired is measured with an electronic imaging device;
- c) the measured texture is converted to a coarseness value
- d) the measured colour and texture data and the coarseness value are used to determine, in a databank, a paint formula with colorimetric and texture properties most closely matching those of the original car paint."

- VI. During the oral proceedings, the appellant explained that document D2 could be considered the closest prior art because of the disclosure of colour and texture measurement. The subject matter was novel over this disclosure by virtue of the matching and databank. The problem is matching a given colour, whereas document D2 refers to quality control. Formulation is mentioned but there is no teaching of a method for matching. In

context, document D2 thus discloses quality control (column 16, lines 31-33) of different formulations, there being pre-stored standards. None of this amounts to a suggestion of use for matching. Thus there is a different purpose and application, according to the prior art quality of an already manufactured product and in the invention, the repair of a car body.

A combination of the teachings of documents D2 and D3 is not called for because of the different technical fields. Only hindsight could suggest such a combination and the following the usual could/would approach does not lead to the combination. Document D3 is not the closest prior art because it teaches a tri-stimulus analyser and does not use imaging devices.

Texture matching is influenced by particle size and shape. Use of swatches is time consuming and inaccurate. According to the invention, such problems are solved by measurement with an electronic imaging device. Thus, coarseness values, explicitly referred to in the auxiliary requests, can be used for automatic processing, rather than being manually determined as in the past. Document D2 mentions formulation for both colour and texture measurement and thus teaches away from separate instruments as claimed in claim 10.

The other features claimed according to the auxiliary requests are also not obvious in the light of the documents cited. Car repair, which is not the same field as document D3 apparently concerning furniture, is facilitated, especially in the case of metallic paint, if colour and texture are matched at the same time. In response to a question from the board, the

appellant did explain, however, that the reference to cluster size, quantity of clusters, grain size and grain density in document D2 falls within the meaning of texture as used in the application.

Document D2 refers to standard values collected at the time of calibration, in other words, measurement is subsequent to this. Performing calibration and measurement at the same time as in the invention is simple and accurate compared therewith and is explained on page 17, lines 18-21 of the application.

As is known, the appearance of colour can change with angle of observation, so proper measurement requires determination at two different angles. This is inventive over the disclosure of document D2.

VII. At the end of the oral proceedings, the board gave its decision.

## **Reasons for the Decision**

1. The appeal is admissible.

2. *Prior Art*

2.1 Document D2

This document explains that colorimeters and spectrophotometers have traditionally been used in quality control, shade sorting, and formulation without the ability to differentiate the visual effects that texture variations on the sample surface have on

overall appearance. Spatial colour is where the texture is not uniform or where surface characteristics vary with illumination or viewing angle. Non-uniformities in the colour of a sample contribute to the overall appearance of the item and traditional colour measuring instruments, i.e. spectrophotometers and calorimeters, integrate the entire viewed area into a single colour measurement. These instruments cannot distinguish differences in the spatial patterns of colour that give many products their distinctive appearance. The document teaches that video images of samples placed into the field of view of the camera are digitized and converted from the colour camera's red, green, and blue (RGB) colour space to the internationally recognized and standardized CIE XYZ colour space using a transformation matrix. The colour camera is calorimetric in design, in that it uses three primary coloured filters to designate colour. Each CIE XYZ tristimulus value is converted to calorimetric coordinates of lightness, chroma, and hue ( $L^*C^*h$ ), integrated for the light source used to capture the image of the sample. Each spatial position on the detector array, or pixel, collects this calorimetric data. These image data are then analyzed to determine colour distributions, texture, and other appearance attributes of the sample. A calibration process is employed to ensure repeatability and measurements that agree with visual comparisons made by trained observers. In measurement of a sample, averages of RGB, values are calculated making use of standard values collected at the time of calibration. Colorimetric analysis is performed to compare the colour of each defined attribute to that of a pre-stored standard. Optional analysis techniques can also be enabled to quantify and

compare such aspects of the sample's appearance as gloss, cluster size, quantity of clusters, grain size, grain density, and numerous other appearance attributes. The ability is provided to quantify appearance attributes of a sample, such as texture or graining, that cannot be measured with traditional colour measuring instruments.

## 2.2 Document D3

This document teaches a method of matching a selected colour with predetermined available paint colours to obtain the closest match, comprising the steps of using a portable colour meter to analyze the selected colour and store chromaticity data representing the hue, chroma and brightness of the selected colour, coupling the selected chromaticity data in the portable colour analyzer to a computer, comparing the selected colour chromaticity data representing the selected colour with a database in the computer representing available paint formulas and selecting the one of the stored available paint formulas most closely matching the chromaticity data representing the selected colour. The colour meter used is a portable light weight, compact tri-stimulus colour analyzer for measuring reflected colour.

## 3. *Main Request - Claim 1*

- 3.1 The board agrees with the appellant that document D2 can be considered the closest prior art document. Moreover, the board agrees that document D2 does not disclose a colour matching method involving use of a databank and calculated colorimetric data to determine a matching colour. However, as pointed out by the

- examining division, document D2 does compare colours using calculated colorimetric data (see, for example, column 10 to line 28 or column 14 first paragraph).
- 3.2 Therefore, the problem solved by the novel features of the invention is simply to realise that the known method is applicable to colour matching. In view of the mentioning of formulation in document D2 (column 1, line 13) and the fact that colour matching using a databank is well known, for instance from document D3 (e.g. column 4, lines 8-10), the board is convinced that no hindsight is necessary for the realisation concerned to have been obvious to the skilled person. In particular, a passing or failing on colour or texture in quality control does not lead the skilled person away from matching. In other words, the skilled person not just could, but would have realised that the colour comparison method is just as applicable for colour matching.
- 3.3 The counter argument of the appellant is not persuasive because, in essence, the "does not disclose matching" approach supports novelty - which is indeed present - but not inventive step, whereas the board takes the line set out in the preceding paragraph.
- 3.4 The subject matter of claim 1 of the main request cannot therefore be considered to involve an inventive step within the meaning of Article 56 EPC.
4. *Main Request - Claim 10*
- 4.1 This claim makes reference to determining "texture". Although the term is imprecise, the appellant explained



during the oral proceedings before the board, that the texture referred to in, say, column 8, line 17, taken with the references to grain size, and density in the sentence bridging columns 2 and 3 of document D2, means that document D2, like the application, teaches measuring texture. The board observes that, in particular, the reference to grain size means that coarseness is taken into account. As with colour, texture matching as opposed to comparing is novel over the disclosure of document D2. However, having obviously realised that the method of document D2 applies to matching, the board considers it obvious that texture matching is used.

- 4.2 The subject matter of claim 10 also differs from the disclosure of document D2 in that the colour measurement is made not with an electronic imaging device, but with a spectrophotometer or tri-stimulus meter, i.e. the known standard colour measuring method, also used for example in document D3. The board is not convinced by the position of the appellant that selecting only texture for measuring with an electronic imaging device should be considered inventive. The reason for this is that document D2 teaches that "colorimeters and spectrophotometers have traditionally been used in quality control, shade sorting, and formulation without the ability to differentiate the visual effects that texture variations on the sample surface have on overall appearance." It is therefore obvious that an electronic imaging device must be used for texture measurement, whether or not a standard tri-stimulus meter or spectrophotometer is used for colour determination. Accordingly, the board was not satisfied as to inventive step of the subject matter of claim 10.

5. *Auxiliary Requests 1 to 9*

5.1 The appellant has dredged through the application for features which are not explicitly disclosed in document D2 and presented various permutations of independent claims involving these features. None of the features concerned can be considered to contribute an inventive step to the subject matter of the claims concerned for the reasons given in sections 5.2 to 5.5, below.

5.2 Coarseness Value (Auxiliary Request 3 - Claim 1, Auxiliary Request 6 - Claim 1, Auxiliary Request 9 - Claim 1.

Since grain size, i.e. coarseness is a property addressed in measuring texture of samples according to the teaching of document D2, use of its converted numerical value in matching is obvious because when the teaching of document D2 is applied to matching (see section 4.2), use of any of the specific attributes of the samples capture by the electronic imaging device, including, in particular coarseness, is obvious. The solution to the problem said during the oral proceedings by the appellant to be solved by the feature, namely automating a hitherto manual processing of coarseness data, amounts to no more than providing an obvious desideratum.

5.3 Car Repair Paint (Auxiliary Request 1 - Claim 1, Auxiliary Request 1 - Claim 10, Auxiliary Requests 3 - Claim 1, Auxiliary Request 4 - Claim 1, Auxiliary Request 4 - Claim 10, Auxiliary Request 6 - Claim 1,

Auxiliary Request 7 - Claim 1, Auxiliary Request 7 - Claim 10, Auxiliary Request 9 - Claim 1)

The appellant argued during the oral proceedings that a car repair paint should be considered inventive because the paint matching taught by document D3 relates to furniture paints. The board is not persuaded by this argument because the skilled person (and many car drivers who have scratched their car) knows that paint matching is essential for car paints. The issue is thus not that a car is not obvious from a piece of furniture, but that paint matching is well known to be necessary for both furniture and cars.

5.4 At the Same Time (Auxiliary Request 1 - Claim 1, Auxiliary Request 4 - Claim 1, Auxiliary Request 7 - Claim 1)

Claims with this feature are restricted to the first alternative in section (b) of claim 1 of the main request, so that novelty is provided over the teaching of document D2, where calibration takes place in advance of measurement, i.e. the second alternative in feature (b) of claim 1 of the main request. The board can accept that there may be advantages in speed and, in some conditions accuracy using concurrent calibration and measurement, but this is no more than what the skilled persons obviously expects, there is no subject matter involving an inventive step. In fact, page 17, lines 20-21 of the application, the very part referred to by the appellant, even recite that there is hardly any difference between calibrating beforehand and simultaneously.

- 5.5 At least Two Different Angles (Auxiliary Request 1 - Claim 10, Auxiliary Request 2 - Claim 1, Auxiliary Request 3 - Claim 1, Auxiliary Request 4 - Claim 10, Auxiliary Request 5 - Claim 1, Auxiliary Request 6 - Claim 1)

It is undoubtedly known to the skilled person that spatial colour is liable to change with viewing angle (see for instance lines 20-21 of column 1 of document D2). The board thus accepts that more than one measurement of colour at different angles with a spectrophotometer can improve accuracy. This is no more than a standard procedure of the type referred to in the summons communication of the board and therefore does not contribute anything unknown or unexpected leading to an inventive step in the context of the present method.

6. The board therefore reached the view that none of the sixteen independent claims submitted in the ten requests could be considered directed to subject matter involving an inventive step within the meaning of Article 56 EPC.

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar

The Chairman

M. Kiehl

A. G. Klein