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Datasheet for the decision
of 13 March 2014

Case Number:	T 0241/13 - 3.4.02
Application Number:	99945459.8
Publication Number:	1110078
IPC:	G01N21/88, H01L21/66
Language of the proceedings:	EN

Title of invention:
ADAPTIVE LIGHTING SYSTEM AND METHOD FOR MACHINE VISION
APPARATUS

Patent Proprietor:
Asti Holdings Limited

Opponent:
ISMECA Semiconductor Holding SA

Relevant legal provisions:
EPC Art. 123(2)

Keyword:
Amendments - added subject-matter (yes)

Decisions cited:
G 0007/93, T 0028/10

Catchword:

That an <u>ambiguous</u> expression as filed *may* be interpreted in a particular way is not sufficient to ensure the compliance of an amendment, based on that interpretation, with Article 100(c) EPC which requires a direct and <u>unambiguous</u> disclosure in the application as filed.

See decision, point 1.3.1, second paragraph.

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Case Number: **T 0241/13 - 3.4.02**

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 13 March 2014

Appellant: Asti Holdings Limited
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Decision under appeal: **Decision of the Opposition Division of the**
                             European Patent Office posted on 20 November
                             2012 revoking European patent No. 1110078
                             pursuant to Article 101(2) EPC.

Composition of the Board:

Chairman: D. Rogers
Members: A. Hornung
                     F. J. Narganes-Quijano

Summary of Facts and Submissions

I.   The patentee appealed against the decision of the opposition
        division revoking European patent No. 1110078.

        Opposition was filed against the patent as a whole and based
        on the grounds of Article 100(a), together with Articles
        54(1) and 56 EPC, Article 100(b) EPC and Article 100(c) EPC.

        The opposition division held that the grounds for opposition
        mentioned in Article 100(c) EPC prejudiced the maintenance of
        the patent as granted. Moreover, the opposition division did
        not admit into the proceedings the patentee's first auxiliary
        request, filed during oral proceedings, for being late filed.

II.   Oral proceedings before the board were held on 13 March 2014.

III.   The patentee-appellant requested that the decision of the
        opposition division be set aside and that the patent be
        maintained as granted (main request), or alternatively,
        maintained upon the basis of either the first or second
        auxiliary requests, both filed under cover of a letter dated
        2 April 2013. The patentee also requested that if any of the
        claim requests was found to satisfy the requirements of
        Article 100(c) and 123(2) EPC, the case be remitted to the
        department of first instance for further prosecution.

        The opponent-respondent requested that the appeal be
        dismissed and that the first and second auxiliary requests
        not be admitted into the proceedings.

IV.   Independent claim 1 according to the patentee's main request
        reads as follows:

Claim 1. "Method for illuminating an article for inspecting
by a machine vision apparatus, wherein said machine vision
apparatus includes a lighting array comprising a plurality of
light emitting elements, a camera for capturing an image of
said article when illuminated and a processor including a
circuit for recording an image captured by said camera, a
memory, a processor circuit and a lighting intensity control
circuit for controlling the intensity of light emitted by at
least selected ones of said light emitting elements to adjust
the illumination of said article, said method comprising the
steps of:

a) retrieving a threshold light intensity level for selected
ones of said lighting elements from a configuration file in
said processor corresponding to the physical characteristics
of the article to be illuminated;

b) capturing an image of said article with the lighting array
illuminated at selected light intensities corresponding to
said threshold level in said configuration file;

c) determining a median gray value of intensity of the
captured image and comparing said median gray value to a
predetermined threshold value for the particular type of
article being viewed;

d) increasing the light intensity level of said lighting
array a predetermined amount;

e) capturing another image;

f) repeating steps (c) through (e) until the median gray
value of the image corresponds substantially to said
predetermined threshold value; and

(g) saving the final light intensity level of selected
lighting elements in the configuration file for future use in
inspecting articles of the same type."

Independent claim 1 according to the patentee's second
auxiliary request reads as follows:

Claim 1. "Method for illuminating an article for inspecting by a machine vision apparatus, wherein said machine vision apparatus includes a lighting array comprising a plurality of light emitting elements, a camera for capturing an image of said article when illuminated and a processor including a circuit for recording an image captured by said camera, a memory, a processor circuit and a lighting intensity control circuit for controlling the intensity of light emitted by at least selected ones of said light emitting elements to adjust the illumination of said article, said method comprising the steps of:

a1) retrieving a threshold light intensity level for selected ones of said lighting elements from a configuration file in said processor corresponding to the physical characteristics of an article to be illuminated;

a2) retrieving a threshold value of image intensity from the configuration file;

b) capturing an image of said article with the lighting array illuminated at selected light intensities corresponding to said threshold light intensity level in said configuration file;

c1) determining a median gray value of intensity of the captured image and comparing said median gray value to said predetermined image intensity threshold value for the particular type of article being viewed;

c2) if the median gray value is far from said predetermined image intensity threshold, starting the intensity level of the selected lighting elements for the image capture from a minimum value;

d) increasing the light intensity level of said lighting array a predetermined amount;

e) capturing another image;

f) repeating steps (c1), (d) and (e) until the median gray value of the image corresponds substantially to said predetermined threshold value; and

(g) saving the final light intensity level of selected lighting elements in the configuration file for future use in inspecting articles of the same type."

Reasons for the Decision

1.   Main request

Claim 1 as granted contains subject-matter which extends beyond the content of the application as filed, contrary to the requirements of Article 100(c) EPC.

1.1   Amendment of claim 1

Present claim 1 is generally based on claims 30 to 32 of the application as filed, wherein, inter alia, the expression in step (a) of claim 30 of the application as filed, "retrieving a threshold intensity value", has been amended to read "retrieving a threshold <u>light</u> intensity <u>level</u>".

Interpreting this amendment in a technically sensible manner leads to a claim which comprises the combined steps (a) and (d) of retrieving a threshold light intensity level from a configuration file and, starting from that retrieved level, increasing the light intensity level by a predetermined amount.

1.2   No basis in the application as filed can be found for this combination of steps.

1.2.1   Claims 30 to 32 of the application as filed do not provide a sufficient basis for the above amendment.

Independent method claim 30 of the application as filed
discloses

-       in step (a), retrieving "a threshold intensity value"
        which appears to correspond to an <u>image</u> intensity of
        the captured image of the inspected article, since step
        (c) of the claim requires the comparison of a median
        gray value of intensity of the captured image "to <u>the</u>
        threshold value",

-       in step (b), illuminating the article to be inspected
        at selected intensities and capturing an image thereof,
        wherein the "selected intensities" appear to correspond
        to the "<u>minimum light intensity setting</u>" disclosed on
        page 15, lines 10-16, of the original description,

-       in step (d), increasing the emitted light intensity
        level as defined by the "minimum light intensity
        setting" of <u>step (b)</u>, before capturing another image.

In contrast to claim 30 of the application as filed, granted
claim 1, that is claim 1 of the main request, discloses

-       in step (a), retrieving a "threshold light intensity
        level" which is the <u>light</u> intensity emitted by the
        lighting array,

-       in step (b), illuminating the article to be inspected
        "at selected light intensities corresponding to said
        threshold level" and capturing an image thereof,
        wherein the "selected light intensities" appear to
        correspond to the emitted light intensity retrieved in
        <u>step (a)</u>.

-    in step (d), increasing the emitted light intensity
     level as retrieved in <u>step (a)</u>, before capturing
     another image.

It follows that claims 30 to 32 of the application as filed
do not disclose the retrieval, from a configuration file, of
a light intensity level which is increased before capturing
another image.

1.2.2   The description of the application as filed does also not
        provide a sufficient basis for the above amendment.

        The description of the application as filed discloses on page
        12, line 21 to page 17, line 6, and with reference to the
        flow-chart of figure 8, a method for illuminating an article
        to be inspected by a machine vision apparatus.

        The disclosed method <u>starts</u> with step 80 in figure 8 to
        "retrieve a threshold value of image intensity and selected
        lighting array segments to be used for illuminating the
        package from a configuration file" (page 13, lines 17-24).
        The retrieval of these "selected lighting array segments to
        be used for illuminating" does not mean that a threshold
        light intensity is retrieved but only identifies which
        segments are to be used.

        Then, an image of an article to be inspected is captured
        (step 82), the article being illuminated "at a minimum
        intensity setting of the lighting array using the
        predetermined lighting segments" (page 15, lines 1-10). There
        is no disclosure in the original description that this
        "minimum intensity setting" is retrieved from a configuration
        file.

        Finally, after a histogram process (step 84) and an iterative
        process of comparing the median gray value of the pixel

intensity distribution with an image intensity threshold value for good image contrast (steps 86, 88, 90), the <u>final</u> light intensity setting, corresponding to the condition when the median gray value reaches the threshold value, is saved to the configuration file for the particular package type (step 92; see page 15, lines 10-26). Hence, the only disclosure of a light intensity being stored in a configuration file for subsequent usage is about a <u>final</u> light intensity which required the preceding step 80 of retrieving a threshold image intensity.

Consequently, there is no disclosure of a method as claimed, comprising the steps of retrieving a threshold light intensity level and then increasing that particular threshold light intensity level before capturing another image.

1.3   *The patentee presented the following counter-arguments.*

1.3.1   The patentee argued that since a light intensity is saved to the configuration file (page 15, lines 22-26), it is implicit that it is retrieved at a later stage. In particular, the description discloses on page 16, lines 4-13, that at the start of inspection of the <u>next</u> lot of semiconductor packages, and if the median gray value is far from the threshold value, the iterative process of increasing the light intensity from the minimum intensity level of the lighting array and comparing it to the threshold is restarted. The process is carried out until the optimum setting is reached again. For the patentee, the minimum intensity setting is the light intensity as retrieved from the configuration file. Therefore, the description discloses the retrieval of a light intensity level from a configuration file and its subsequent increase.

The board accepts the implicit disclosure of retrieving a light intensity level at the beginning of the verification

process. However, there is no basis for the patentee's assertion that the minimum intensity setting, from which the verification process starts, is the same light intensity level as retrieved from the configuration file. It is true that the description does not give a precise definition of the meaning of the expression "minimum intensity level" and that, therefore, the patentee's interpretation of this expression is not clearly excluded. That such an <u>ambiguous</u> expression as filed *may* be interpreted in a particular way is not sufficient to ensure the compliance of an amendment, based on that interpretation, with Article 100(c) EPC which requires a direct and <u>unambiguous</u> disclosure in the application as filed. In the present case, no direct and unambiguous disclosure can be found for the patentee's interpretation, i.e. a method step of increasing the light intensity level as retrieved from the configuration file. On the contrary, the skilled person, reading the original application, would rather construe the disclosed verification process as follows:

-       The verification process starts with illuminating the next lot of semiconductor packages with the light intensity level which has been previously determined as being the optimum setting and which has been saved to the configuration file (page 15, lines 22-26). Either the resulting illumination is close to optimum, thereby enabling the inspection of the next lot of semiconductor packages without increasing the light intensity, or the illumination is far from optimum, whereby the iterative process shown in figure 8 is restarted with the light intensity level increased from a "minimum intensity level". It is evident that this "minimum intensity level" corresponds to the lowest level possible and not, as contended by the patentee, to some intermediate level corresponding to the previously determined optimum setting, retrieved from

the configuration file. Indeed, in case that the
illumination at the beginning of the verification
process, generated by the retrieved light intensity
level, is far too intense, it would make no technical
sense to carry out the iterative process by further
increasing the light intensity level. Therefore, none
of the above alternative illumination situations is
covered by the claimed method steps.

In conclusion, in the board's view, the application as filed
discloses that the light intensity level as retrieved from a
configuration file is either maintained unchanged or reduced
to a minimum, but not increased as defined in granted claim
1.

1.3.2   In support of his contention that the application as filed
discloses the retrieval from a configuration file of a light
intensity level which is increased by a predetermined amount,
the patentee argued that the expressions "final intensity
level" (page 13, line 14; page 15, lines 22-23), "preselected
light emitting intensities" and "minimum [light] intensity
setting [or level]" (page 15, lines 7-8 and 12-13; page 16,
lines 10-11) correspond to the same light intensity level
being retrieved from the configuration file.

There is however no basis in the application as filed for the
patentee's contention in this respect. In particular, the
description as filed does not give a clear definition about
the meaning of at least the two latter expressions. For
instance, the origin of "preselected light emitting
intensities" is simply left open by the description as filed.
Moreover, for the reasons given above (point 1.3.1), it is
technically not plausible that the "final intensity level"
and the "minimum intensity setting" are the same.

1.3.3   According to the patentee, basis for step (a) of present
        claim 1 is to be found in step (a) of claim 30 of the
        application as filed because the expression "threshold
        intensity value" in claim 30 of the application as filed has
        to be interpreted as meaning "threshold light intensity
        level". The wording was only amended for clarification
        purposes: adding the word "light" clarifies the fact that
        illumination light is referred to, whereas the words "value"
        and "level" are interchangeable.

        The board is not convinced by this argument.

        Firstly, according to step (c) of claim 30 of the application
        as filed, the median gray value of intensity of the captured
        image is compared to "the threshold value". Since the median
        gray value of step (c) is a statistical measure of an *image*
        intensity value, "the threshold value" of step (c) must also
        be an *image* intensity value. Furthermore, due to the
        antecedent "the" and the similar wording used, "the threshold
        value" of step (c) corresponds, according to the formulation
        of the claim, to the "threshold intensity value" of step (a).
        It follows that original step (a) defines the retrieval, from
        a configuration file, of a threshold *image* intensity value,
        but not the retrieval of a threshold *light* intensity level as
        defined in step (a) of granted claim 1.

        Secondly, except for a limited number of occasions, the terms
        "value" and "level" are generally used throughout the
        application as filed for designating an *image* intensity value
        and a *light* intensity level, respectively. Therefore, the
        skilled person when reading the application would rather link
        the term "value" to an image intensity and the term "level"
        to a light intensity.

        Therefore, the two expressions "threshold intensity value"
        and "threshold light intensity level" have a different

meaning in the context of the application as filed and are
not interchangeable.

2.   First auxiliary request

2.1   The first auxiliary request on file is the same as the first
        auxiliary request submitted by the patentee at the oral
        proceedings before the opposition division. The request was
        not admitted by the opposition division into the proceedings
        for being late filed.

        According to the appealed decision, point 5, "the objections
        under Article 123(2) essentially had not changed since the
        issuance of the summons to oral proceedings and hence the
        subject of the proceedings has not changed". Moreover, the
        opposition division argued that "the amendments contained
        subject-matter which was not covered by the dependent claims.
        It follows that it cannot be argued that they contained
        subject-matter that the opponent should have expected to
        discuss". The opposition division concluded that "the
        auxiliary request was therefore not admitted into the
        opposition proceedings under Rule 116(2) EPC".

        The question before the board is therefore whether the
        opposition division correctly exercised its discretion in not
        admitting this request. The principle laid down in the
        decision G 7/93 (OJ EPO 1994, 775), point 2.6 of the reasons,
        and applied, for instance, in T 28/10, point 2.1 of the
        reasons, is that the exercise of discretion by the first
        instance should only be overturned by the board if wrong
        criteria were applied, or if the discretion was exercised
        unreasonably. The board is of the view that the opposition
        division correctly exercised its discretion and therefore
        decides not to admit the first auxiliary request into the
        proceedings under Article 12(4) RPBA.

2.2   The patentee argued that it only understood during oral
        proceedings the precise reason why the opposition division
        found that Article 100(c) EPC was not complied with. In
        particular, the opposition division's argument that the step
        of retrieving the threshold intensity value is to be seen as
        a missing essential feature became clear only during the oral
        proceedings. Therefore, the first auxiliary request, which
        corresponds to the attempt to overcome this precise reason by
        re-introducing the missing step, could not have been filed
        earlier.

        The board does not find this argument convincing because the
        objection under Article 100(c) EPC had been dealt with in
        detail in the summons to oral proceedings before the
        opposition division. In particular, the summons explained
        that step (a) of claim 1 of the patent, i.e. retrieving a
        threshold light intensity level, and step (a) of claim 30 as
        filed, i.e. retrieving a threshold intensity value, are of a
        different nature. Nevertheless, the patentee decided not to
        file any auxiliary request in response to these objections.

3.   Second auxiliary request

        The second auxiliary request is admitted into the
        proceedings. No purpose is served discussing admissibility
        further given the outcome of the board's decision on the
        compliance of this request with Article 123(2) EPC.

3.1   Claim 1 of the second auxiliary request differs from claim 1
        of the main request mainly in that steps (a2) and (c2) have
        been added. According to the new step (a2), a "threshold
        value of image intensity" is retrieved from the configuration
        file, in addition to the retrieval of the threshold light
        intensity level in step (a). According to the new step (c2),
        if the median gray value is far from the predetermined image

intensity threshold, the intensity level of the selected lighting elements for the image capture is started from a minimum value.

The claimed method according to the main request has been found by the board to contain subject-matter extending beyond the content of the application as filed (see point 1.2 above).

Step (a2) clearly does not remove that added subject-matter, i.e. the retrieval of a threshold light intensity level and its subsequent increase, since step (a2) merely adds an additional step.

Step (c2), notwithstanding any lack of clarity of its wording, seems to define an intensity level of the lighting array which, under the condition that the median gray value is far from the predetermined image intensity threshold, is set to a minimum value before increasing it. However, when the above condition is not fulfilled, i.e. when the median gray value is not far from the predetermined image intensity threshold, then step (c2) leaves the method of the second auxiliary request unchanged with respect to the method of the main request and, hence, does not remove the added subject-matter.

It follows that claim 1 of the second auxiliary request infringes Article 123(2) EPC for the same reasons as that of the main request.

3.2   The patentee explained that step (c2) is based on the original description, page 16, lines 8-13. Moreover, the patentee re-explained that the minimum intensity level of step (c2) corresponds to the retrieved threshold light intensity level of step (a1) (see point 1.3.2).

In the view of the board, these arguments are not suitable to
invalidate the above reasoning since they do not address the
question of how adding steps (a2) and (c2) can remove the
added subject-matter from the claimed method.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

M. Kiehl   D. Rogers

Decision electronically authenticated