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Datasheet for the decision of 22 October 2015

Case Number: T 2107/10 - 3.4.03

Application Number: 05252652.2

Publication Number: 1591966

IPC: G07C3/00, G07C3/14

Language of the proceedings: EN

Title of invention:
Quality control apparatus and control method of the same, and recording medium recorded with quality control program

Applicant:
OMRON CORPORATION

Headword:

Relevant legal provisions:
EPC Art. 123(2)
EPC 1973 Art. 56

Keyword:
Amendments - added subject-matter (yes) - main request, first to sixth auxiliary requests
Inventive step - (yes) - seventh auxiliary request

Decisions cited:

Catchword:

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European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 2107/10 - 3.4.03

D E C I S I O N
of Technical Board of Appeal 3.4.03
of 22 October 2015

Appellant: (Applicant)	OMRON CORPORATION 801, Minamifudodo-cho, Horikawahigashiiru, Shiokoji-dori, Shimogyo-ku Kyoto-shi, Kyoto 600-8530 (JP)
Representative:	Calderbank, Thomas Roger Mewburn Ellis LLP City Tower 40 Basinghall Street London EC2V 5DE (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 26 May 2010 refusing European patent application No. 05252652.2 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	G. Eliasson
Members:	T. M. Häusser
	C. Schmidt

Summary of Facts and Submissions

I. The appeal concerns the decision of the examining division refusing the European patent application No. 05252652 for lack of inventive step (Article 56 EPC 1973).

II. At the oral proceedings before the board the appellant requested that the decision under appeal be set aside and that a patent be granted either on the basis of the main request, filed with the notice of appeal or - alternatively - on the basis of one of the auxiliary requests 1 to 6, filed with the letter dated 22 September 2015, or on the basis of the 7th auxiliary request, filed at the oral proceedings before the board.

III. Reference is made to the following documents:

D1: WO 02/29733 A,
D3: WO 03/008996 A.

IV. The wording of the relevant independent claims of the various requests is as follows (board's labelling "(a)", "(b)", "(a)'", "(b)'", and "(i)" to "(vii)"):

Main request:

"1. A quality control apparatus (10) which controls a manufacturing process in order to manufacture products (7) of predetermined quality from works (2), the apparatus comprising:

a storing module (11) which collects measurement data measured by a plurality of measuring devices (3, 4, 5, 6) disposed in the manufacturing process and stores the collected measurement data along with time

data indicative of when each measurement data is measured or collected; and
(a) an associating module (12) which makes a plurality of data sets (n, n+1, n+2, n+3) each of which includes measurement data which are measured by one of the measuring devices and considered to belong to the same one of the works, with reference to the time data and dead time (Td1, Td2, Td3) generated between the measuring devices, and which determines whether the data sets can be associated with each other. [sic]
(b) wherein the number of the measurement data included in each of the data sets is made constant."

First, second and third auxiliary requests:

Claim 1 of the first auxiliary request differs from claim 1 of the main request merely in that the erroneous full stop at the end of feature (a) is replaced with a comma.

Claim 1 of the second auxiliary request and claim 1 of the third auxiliary request differ from claim 1 of the first auxiliary request in comprising additional features of the dependent claims.

Fourth auxiliary request:

"1. A quality control apparatus (10) which controls a manufacturing process in order to manufacture products (7) of predetermined quality from works (2), the apparatus comprising:
a storing module (11) which collects measurement data measured by a plurality of measuring devices (3, 4, 5, 6) disposed in the manufacturing process and stores the collected measurement data along with time

data indicative of when each measurement data is measured or collected; and

(a)' an associating module (12) which forms a plurality of data sets (n, n+1, n+2, n+3) with reference to the time data and dead time (Td1 , Td2, Td3) generated between the measuring devices, and which determines whether the data sets are associated with each other or are not associated with each other,

wherein each of the plurality of data sets include measurement data measured by a respective one of the plurality of measuring devices,

wherein each of the plurality of data sets includes items of the measurement data which are measured by the respective one of the measuring devices for a group of works including a given number of works,

wherein the plurality of data sets are considered to belong to the same group of works, and

(b)' wherein the number of the items of the measurement data included in each of the data sets is made constant."

Fifth and sixth auxiliary requests:

Claim 1 of the fifth auxiliary request and claim 1 of the sixth auxiliary request differ from claim 1 of the fourth auxiliary request in comprising additional features of the dependent claims.

Seventh auxiliary request:

"1. A quality control apparatus (10) which controls a manufacturing process in order to manufacture products (7) of predetermined quality from works (2), the apparatus comprising:

a storing module (11) which collects measurement data measured by a plurality of measuring devices (3,

4, 5, 6) disposed in the manufacturing process and stores the collected measurement data along with time data indicative of when each measurement data is measured or collected; and

(i) an associating module (12) which determines whether a plurality of data sets (n, n+1, n+2, n+3) are associated with each other or are not associated with each other, the plurality of data sets (n, n+1, n+2, n+3) being associated or not with reference to the time data and dead time (Tdl, Td2, Td3) generated between the measuring devices,

(ii) wherein each of the plurality of data sets include measurement data measured by a respective one of the plurality of measuring devices,

(iii) wherein each of the plurality of data sets includes items of the measurement data which are measured by the respective one of the measuring devices for a group of works including a given number of works,

(iv) wherein the plurality of data sets which are associated belong to the same group of works,

(v) wherein the storing module collects and stores intermediate characteristic data of an intermediate product measured by an intermediate characteristic measuring device (5) and final characteristic data of a completed product measured by a final characteristic measuring device (6); and

(vi) wherein the apparatus further includes:

a specification limit generating module (13) which generates an intermediate characteristic specification limit set to the intermediate characteristic measuring device based on a data distribution of the final characteristic data stored in the storing module and a final characteristic specification limit set to the final characteristic measuring device; and

(vii) a specification limit setting control module

which controls the intermediate characteristic measuring device so as to set the intermediate characteristic specification limit generated by the specification limit generating module."

"10. A control method of controlling a manufacturing process in order to manufacture products (7) of predetermined quality from works (2), the method comprising:

providing a quality control apparatus (10) comprising a storing module (11) and an associating module (12);

collecting, at the storing module, measurement data measured by a plurality of measuring devices (3, 4, 5, 6) disposed in the manufacturing process and storing the collected measurement data along with time data indicative of when each measurement data is measured or collected, and

determining, at the associating module (12), whether a plurality of data sets (n, n+1, n+2, n+3) are associated with each other or are not associated with each other, the plurality of data sets (n, n+1, n+2, n+3) being associated or not with reference to the time data and dead time (Td1, Td2, Td3) generated between the measuring devices;

wherein each of the plurality of data sets include measurement data measured by a respective one of the plurality of measuring devices,

wherein each of the plurality of data sets includes items of the measurement data which are measured by the respective one of the measuring devices for a group of works including a given number of works,

wherein the plurality of data sets which are associated belong to the same group of works,

wherein the measurement data includes inter-mediate characteristic data of an intermediate product

measured by an intermediate characteristic measuring device (5) and final characteristic data of a completed product measured by a final characteristic measuring device (6), and

wherein the method further comprises:

generating an intermediate characteristic specification limit set to the intermediate characteristic measuring device based on a data distribution of the final characteristic data stored in the storing module and a final characteristic specification limit set in the final characteristic measuring device; and

controlling the intermediate characteristic measuring device so as to set the intermediate characteristic specification limit."

"11. A computer readable recording medium having recorded a quality control program causing a computer to execute the control method according to claim 10."

V. The appellant argued essentially as follows concerning the basis in the application as filed of the amendments effected in relation to the main request and the first to sixth auxiliary requests:

a) Features (a) and (a)'

In relation to feature (a) of claim 1 of the main request, it was apparent from the description on page 27, line 16 to page 28, line 5 that it was the scheduler that made the plurality of data sets from the measurement data stored in the data storing part 11. Furthermore, it followed from the description on pages 28 and 29 that data were "associated" by the scheduler thus making the data sets.

These arguments also applied to claim 1 of the first to sixth auxiliary requests. Furthermore, in claim 1 of the fourth to sixth auxiliary requests the term "makes" has been replaced with "forms" as used on page 5 of the application as filed (feature (a)').

b) Features (b) and (b)'

In relation to feature (b) of claim 1 of the main request the appellant argued that according to page 28, lines 1-5 of the application as filed the sets of measurement data might be formed by including a given number of works in each set or by including the works processed during a given time period. In either case the number of measurement data items might be made constant. The wording of the claim was thus suitably based on the application as filed.

These arguments also applied to claim 1 of the first to sixth auxiliary requests. Furthermore, in claim 1 of the fourth to sixth auxiliary requests the expression "the measurement data" has been replaced with "the items of the measurement data" as used on page 4, paragraph 1 of the application as filed (feature (b)').

Reasons for the Decision

1. Main request - amendments

1.1 Feature (a)

1.1.1 Claim 1 of the main request has been amended in that it is specified that the associating module "makes a plurality of data sets ... with reference to the time data and dead time ... generated between the measuring devices" (feature (a)).

The appellant argued that it was apparent from the description on pages 27 to 29 that the scheduler made the plurality of data sets from the measurement data stored in the data storing part 11, in particular that the measurement data were "associated" by the scheduler thus making the data sets.

1.1.2 However, in the application as filed it has merely been disclosed that the associating module, which is also referred to as "scheduler" (see page 26, last paragraph), *associates* the sets of measurement data with each other in consideration of the dead time generated between the measuring devices (see, for example, page 4, fourth paragraph and page 5, third paragraph). There is no indication in the application as filed that the associating module *makes* these data sets.

Accordingly, the association referred to on pages 28 and 29 of the description ("associated by the scheduler 12") relates to different data sets being associated with each other, rather than one data set being assembled. In particular, on page 28, lines 6-10, it is mentioned that a set of intermediate characteristic data is associated by the scheduler with a set of final characteristic data; moreover, on page 29, lines 3-10, it is mentioned that a set of control data is associated by the scheduler with a set of intermediated characteristic data.

1.1.3 The subject-matter of feature (a) of claim 1 of the main request is therefore not directly and unambiguously derivable from the application as filed.

1.2 Feature (b)

1.2.1 Claim 1 of the main request has been amended in that it is specified that "the number of measurement data included in each of the data sets is made constant" (feature (b)).

The appellant argued that according to page 28, lines 1-5, of the application as filed the sets of measurement data might be formed by including a given number of works in each set or by including the works processed during a given time period. In either case the number of measurement data items might be made constant.

1.2.2 The wording of feature (b) is considered to imply that the number of measurement data included in each data set is manipulated in such a way as to be rendered constant.

However, in the passage cited by the appellant it is merely mentioned that the series of items of data serving as the basis for the association is called a set. There is no indication that the number of items of data in a set might be changed or manipulated.

1.2.3 Furthermore, on page 39, paragraph 2 of the description the following is specified in relation to the number of items of data in a data set:

"When the time period Ts for a set is expressed by the number of the works 2, the number of items of data included in each of the associated sets is constant, and thus the accuracy of statistics for each set can be nearly matched."

Due to the reference to the number of the works and the matching accuracy of the statistics for each data set it is evident for the skilled man that the different items of data in the data sets concern the measurements in relation to the respective works 2 and that the numbers of items of data contained in the various associated sets of data are in fact *equal to each other*. This is also conveyed in the passage on page 5, paragraph 3.

However, from the discussion above it is apparent that this is not what is claimed in feature (b).

1.2.4 The subject-matter of feature (b) of claim 1 of the main request is therefore not directly and unambiguously derivable from the application as filed.

1.3 In view of the above, claim 1 of the main request contains subject-matter which extends beyond the content of the application as filed, contrary to the requirements of Article 123(2) EPC.

2. First to third auxiliary requests - amendments

Claim 1 of the first auxiliary request differs from claim 1 of the main request merely in that an erroneous full stop is replaced with a comma. Claim 1 of each of the second and third auxiliary requests differs from claim 1 of the first auxiliary request in comprising additional features of the dependent claims which do not affect the meaning of features (a) and (b).

Consequently, claim 1 of each of the first to third auxiliary requests contains - for the reasons mentioned under point 1 above - subject-matter which extends

beyond the content of the application as filed, contrary to the requirements of Article 123(2) EPC.

3. Fourth to sixth auxiliary requests - amendments

Claim 1 of the fourth to sixth auxiliary requests differs from claim 1 of the first to third auxiliary requests, respectively, essentially in that (board's highlighting of the differences):

- "an associating module (12) which makes a plurality of data sets ..." (feature (a)) is replaced by "an associating module (12) which forms a plurality of data sets ..." (feature (a)'), and
- "wherein the number of the measurement data included in each of the data sets ..." (feature (b)) is replaced by "wherein the number of the items of the measurement data included in each of the data sets ..." (feature (b)').

These are considered mere reformulations conveying the same meaning. Accordingly, for the reasons mentioned under points 1 and 2 above, claim 1 of each of the fourth to sixth auxiliary requests contains subject-matter which extends beyond the content of the application as filed, contrary to the requirements of Article 123(2) EPC.

4. Seventh auxiliary request

4.1 Amendments

The objections mentioned above under Article 123(2) EPC have been overcome in relation to the claims of the seventh auxiliary request by way of amendment. These

claims are thus considered to have a basis in the application as filed.

In particular, independent claims 1, 10, and 11 of the seventh auxiliary request are based on original claims 1, 19-20, and 22, respectively, in combination with original claim 6 and the description as originally filed (page 5, third paragraph; page 28, first and second paragraphs; page 35, last paragraph; page 36, first paragraph).

Dependent claims 2 to 9 are based on original claims 3 to 5, 7 to 10, and 12, respectively. The description has been brought into conformity with the amended claims and supplemented with an indication of the relevant content of the prior art without extending beyond the content of the application as filed.

Accordingly, the board is satisfied that the amendments comply with the requirements of Article 123(2) EPC.

4.2 Inventive step

4.2.1 Closest state of the art

In the appealed decision the examining division considered document D1 the closest state of the art. The appellant also started from this document in his assessment of inventive step.

Indeed, document D1 discloses subject-matter that is conceived for the same purpose as the claimed invention, namely for providing a quality control apparatus and method for controlling the process of manufacturing products of predetermined quality from works, and has the most relevant technical features in

common with it, as detailed below. Document D1 is therefore regarded as the closest state of the art.

4.2.2 Distinguishing features

Document D1 discloses (see page 8, line 7 - page 11, line 27; Figures 1, 2, 5, and 6) the monitoring of assembly lines used for the manufacture of products from workpieces. In particular, assembly operations are carried out at two sites 2, 2', each site having a number of lines 3 for assembling the products. Each line has a number of test stages 4 for testing specific properties of the products using, for example, automatic testing equipment 7. Each test stage 4 comprises one or more test stations for carrying out measurements associated with the tests. The test station data comprise the data of the automatic testing equipment 7 as well as other pieces of information, such as the identity of the individual workpieces and the time and date of the test. The test station data from the different test stations are transferred to a yield server computer 9 which processes the data in real time and aggregates them according to a program to produce output information. The latter is stored and manipulated to produce real time and time series information which is communicated to a number of output computers 11. The output information represents specific properties of the process, for example the yield at a test station representing the proportion of workpieces passing the test of the total number of workpieces entering the test station, expressed as a percentage. The yields for each test station are aggregated to produce the yields of the test stages, which are in turn aggregated to produce the yields of the lines 3, one being shown as a percentage 51 in Figure 5. Clicking the "Yield History" button 52

illustrated in Figure 5 will show the line yield as a time series 62 as can be seen in Figure 6.

Using the wording of claim 1 document D1 discloses therefore a quality control apparatus which controls a manufacturing process in order to manufacture products of predetermined quality from works (workpieces), the apparatus comprising:

a storing module (memory of the yield server computer 9) which collects measurement data measured by a plurality of measuring devices (test stations of the test stages 4) disposed in the manufacturing process and stores the collected measurement data (test station data) along with time data indicative of when each measurement data is measured or collected (time and date of the tests).

In the decision under appeal the examining division held that document D1 discloses an associating module making a plurality of data sets each including measurement data, but does not disclose that this is performed with reference to the dead time generated between the measuring devices (see points 9.1 to 9.3 of the decision). This reflects the wording of feature (a) of claim 1 of the main request, which underlies the decision. In claim 1 of the seventh auxiliary request feature (a) has been reworded in terms of features (i)-(iv), in which it is specified that the associating module determines whether a plurality of data sets are associated with each other or not with reference to the time data and dead time generated between the measuring devices. Even though document D1 discloses the aggregation of test station data "according to a program", for example the aggregation of the yields for each test station to produce the yield for each test stage (see page 9, second paragraph and page 11, penultimate

paragraph), no details are provided on how this aggregation is performed. In particular, there is no indication that the dead time generated between measuring devices is used for associating data sets.

Therefore, the subject-matter of claim 1 of the seventh auxiliary request differs from the apparatus known from document D1 in comprising features (i) to (vii).

4.2.3 Objective technical problem

The appellant argued that the objective technical problem of the invention is to improve the accuracy and reliability of the quality control. The board agrees. Indeed, the effect of the distinguishing features is to allow a more accurate setting of the intermediate characteristic specification limit. As this limit is used for deciding when to remove or put back an intermediate product (see the description, paragraph bridging pages 24 and 25), the accuracy and reliability of the quality control is improved.

4.2.4 Obviousness

In view of the claimed invention and the formulation of the objective technical problem there is no doubt that the skilled man is the expert in the technical field of quality control systems.

The examining division held in the appealed decision that the combination of document D1 with document D3 leads to the subject-matter of claim 1 of the main request. Document D3 relates to synchronising vehicle sensor data used in an adaptive cruise control system onto the same time base (D3, page 1, first two paragraphs). This document is therefore considered to be

located in the technical field of adaptive cruise control systems. In relation to the technical field of quality control systems this is neither a neighbouring field nor a broader general technical field. Document D3 would therefore not be considered by the skilled man when attempting to solve the posed technical problem. Moreover, the distinguishing features (i) to (vii) are not considered to be disclosed in document D3, either. In the decision under appeal the examining division referred to the sensor dead time ("Sensortotzeit") mentioned in document D3 (see point 9.4 of the decision). However, this is the time period between the sensing process and the moment the sensing data are available at the data bus for transmission (D3, page 5, paragraph 1) rather than the claimed dead time generated between the measuring devices.

Furthermore, neither the other documents on file nor common general knowledge would lead the skilled man to the claimed invention.

Therefore, the subject-matter of claim 1 of the seventh auxiliary request involves an inventive step. Independent method claim 10 of the seventh auxiliary request and computer readable recording medium claim 11 of the seventh auxiliary request correspond essentially to apparatus claim 1. Claims 2 to 9 are dependent on claim 1.

Accordingly, the subject-matter of claims 1 to 11 of the seventh auxiliary request involves an inventive step (Article 52(1) EPC and Article 56 EPC 1973).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to grant a patent in the following version:
   - Claims 1 to 11 of the 7th auxiliary request, filed at the oral proceedings before the board,
   - Description: pages 1, 2, 21 to 72 as originally filed and pages 3 to 11 as filed at the oral proceedings before the board, whereby pages 12 to 20 and 73 to 81 as originally filed were deleted and
   - Drawings: sheets 1/12 to 12/12, filed with letter dated 31 May 2005.

The Registrar: The Chairman:

S. Sánchez Chiquero G. Eliasson

Decision electronically authenticated