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Datasheet for the decision of 11 September 2023

Case Number: T 0422/20 - 3.5.04

Application Number: 14708126.9

Publication Number: 2946369

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Language of the proceedings: EN

Title of invention:
ASSOCIATING A POINT CLOUD IMAGE WITH A PIPING LINE DRAWING AND APPLYING DIMENSIONS REGARDING THE SAME

Applicant:
Intergraph Corporation

Headword:

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - main request (no) - auxiliary requests 1 to 5 (no)

Decisions cited:
T 0643/00

Catchword:

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Case Number: T 0422/20 - 3.5.04

D E C I S I O N
of Technical Board of Appeal 3.5.04
of 11 September 2023

Appellant: (Applicant)	Intergraph Corporation 305 Intergraph Way Madison AL 35758 (US)
Representative:	Kaminski Harmann Patentanwälte AG Landstrasse 124 9490 Vaduz (LI)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 30 September 2019 refusing European patent application No. 14708126.9 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chair	B. Willems
Members:	A. Seeger
	G. Decker

Summary of Facts and Submissions

I. The appeal is against the examining division's decision to refuse European patent application No. 14 708 126.9, published as international application WO 2014/113657 A1.

II. The prior-art documents cited in the decision under appeal included the following:

D1: Naai-Jung Shih and Pin-Hung Wang, "Plumbing Locator in an As-Built Building Form", 20th Annual Association of Researchers in Construction Management (ARCOM) Conference, vol. 1, September 2004, 267-76, XP055118288

D3: Leica Geosystems AG, "Leica CloudWorx", January 2010, 1-6, XP055118007

III. The decision under appeal was based on the grounds that the subject-matter of claims 1 to 15 of the main request, the subject-matter of the independent claims of auxiliary requests 1 to 4 and the subject-matter of claim 1 of auxiliary request 5 did not involve an inventive step within the meaning of Article 56 EPC.

IV. The applicant (appellant) filed notice of appeal. With the statement of grounds of appeal, the appellant filed claims according to a main request and auxiliary requests 1 to 5. According to the appellant, the claims of these requests were identical to the claims of the requests forming the basis for the decision under appeal. The appellant provided arguments to support its opinion that the claims met the requirements of Article 56 EPC.

V. Summons to oral proceedings were issued. In a communication under Article 15(1) RPBA 2020, the board gave the following preliminary opinion.

Document D3 disclosed measuring distances between two points on a point cloud based on their coordinate data in three dimensions. By applying these features to a method according to document D1, the person skilled in the art would have arrived at the claimed subject-matter in a straightforward manner. Therefore, the subject-matter of the independent claims of the main request and auxiliary requests 1 to 4 did not involve an inventive step within the meaning of Article 56 EPC.

The additional features of the independent claims of auxiliary request 5 were either disclosed by document D3 or had no technical effect. Therefore, the subject-matter of the independent claims of auxiliary request 5 also did not involve an inventive step.

VI. By letter dated 22 August 2023, the appellant provided arguments to support its opinion that the claimed subject-matter of auxiliary request 5 was technical and involved an inventive step.

VII. On 11 September 2023, the board held oral proceedings.

The appellant's final requests were that the decision under appeal be set aside and that a European patent be granted on the basis of the claims of the main request or, alternatively, on the basis of the claims of one of auxiliary requests 1 to 5, all requests filed with the statement of grounds of appeal.

At the end of the oral proceedings, the Chair announced the board's decision.

VIII. Claim 1 of the main request reads as follows:

"A method for creating a piping line drawing for a facility using distance data obtained from a point cloud with coordinate data in three dimensions, the method comprising:

- providing a point cloud of a three-dimensional object of the facility, each location in the point cloud having point cloud coordinate data in three dimensions
- forming a piping line drawing by
  - receiving, from one or more users on a user interface, selections of a first location and second location, and
  - forming a line on the piping line drawing between the first and second locations;
- receiving, from the one or more users, selections of a third location and a fourth location on the point cloud, the third location and fourth location defining a distance based on coordinate data in three dimensions for the third and fourth locations on the point cloud; and
- in response to an instruction from the one or more users, applying the distance to the line on the piping line drawing."

IX. Claim 1 of auxiliary request 1 reads as follows (features added compared with claim 1 of the main request are underlined):

"A method for creating a piping line drawing for a facility using distance data obtained from a point

cloud with coordinate data in three dimensions, the method comprising:

- providing a point cloud of a three-dimensional object of the facility, each location in the point cloud having point cloud coordinate data in three dimensions
- forming a piping line drawing by
  - receiving, from one or more users on a user interface, selections of a first location and second location in two dimensions, and
  - forming a two-dimensional line on the piping line drawing between the first and second locations;
- receiving, from the one or more users on the user interface, selections of a third location and a fourth location on the point cloud, the third location and fourth location defining a distance in three dimensions based on coordinate data in three dimensions for the third and fourth locations on the point cloud; and
- in response to an instruction from the one or more users, applying the distance in three dimensions to the two-dimensional line on the piping line drawing."

X. Claim 1 of auxiliary request 2 reads as follows:

"A method for creating a piping line drawing (620) for a facility using distance data obtained from a point cloud (605) with coordinate data in three dimensions, the method comprising:

- forming a piping line drawing (620) in a first window (610) of a user interface (600) by
  - receiving, from one or more users on the user interface (600), selections of a first location and second location, and

- forming a line on the piping line drawing (620) between the first and second locations,

wherein coordinate data for the locations in the first window (610) are for two dimensions;

- providing a point cloud (605) of a three-dimensional object of the facility, each location in the point cloud having point cloud coordinate data in three dimensions;
- receiving, from the one or more users, selections of a third location and a fourth location on the point cloud (605), the third location and fourth location defining a distance based on coordinate data in three dimensions for the third and fourth locations on the point cloud (605); and
- in response to an instruction from the one or more users, applying the distance to the line on the piping line drawing (620)."

XI. Claim 1 of auxiliary request 3 reads as follows (features added compared with claim 1 of auxiliary request 2 are underlined):

"A method for creating a piping line drawing (620) for a facility using distance data obtained from a point cloud (605) with coordinate data in three dimensions, the method comprising:

- forming a piping line drawing (620) in a first window (610) of a user interface (600) by
  - receiving, from one or more users on the user interface (600), selections of a first location and second location, and
  - forming a line on the piping line drawing (620) between the first and second locations,

wherein coordinate data for the locations in the first window (610) are for two dimensions;

- providing, in a second window of the user interface (600), a point cloud (605) of a three-dimensional object of the facility, each location in the point cloud having point cloud coordinate data in three dimensions;
- receiving, from the one or more users, selections of a third location and a fourth location on the point cloud (605) in the second window, the third location and fourth location defining a distance based on coordinate data in three dimensions for the third and fourth locations on the point cloud (605); and
- in response to an instruction from the one or more users, applying the distance to the line on the piping line drawing (620) in the first window (610)."

XII. Claim 1 of auxiliary request 4 reads as follows (features added compared with claim 1 of auxiliary request 3 are underlined and deleted features are ~~struck through~~):

"A method for creating a piping line drawing (620) for a facility using distance data obtained from a point cloud (605) with coordinate data in three dimensions, the method comprising:
- forming a piping line drawing (620) in a first window (610) of a user interface (600) by
  - receiving, from one or more users on the user interface (600), selections of a first location and second location, and
  - forming a line on the piping line drawing (620) between the first and second locations,

  wherein coordinate data for the locations in the first window (610) are for two dimensions;

- providing, in a second window of the user interface (600), a point cloud (605) of a three-dimensional object of the facility, each location in the point cloud having point cloud coordinate data in three dimensions;
- receiving, from the one or more users, selections of a third location and a fourth location on the point cloud (605) in the second window, the third location and fourth location defining a distance based on coordinate data in three dimensions for the third and fourth locations on the point cloud (605); ~~and~~
- in response to an instruction from the one or more users, applying the distance to the line on the piping line drawing (620) in the first window (610);
- receiving an instruction from the one or more users to associate the first location on the piping line drawing (620) with the third location on the point cloud (605) and the second location on the piping line drawing (620) with the fourth location on the point cloud (605); and
- associating the first location with the third location and the second location with the fourth location."

XIII. Claim 1 of auxiliary request 5 reads as follows (features added compared with claim 1 of auxiliary request 4 are underlined and deleted features are ~~struck through~~):

"A method for creating a piping line drawing (620) for a facility using distance data obtained from a point cloud (605) with coordinate data in three dimensions, the method comprising:

- forming a piping line drawing (620) in a first window (610) of a user interface (600), the first window having a drafting board, by
  - receiving, from one or more users on the user interface (600), selections of a first location and second location, and
  - forming a line on the piping line drawing (620) between the first and second locations,

  wherein coordinate data for the locations in the first window (610) are for two dimensions~~;~~, wherein the user interface includes a toolbar having tools
  - for drawing lines on the first window (610) and
  - for inserting components, at least fittings, into the piping line drawing (620) within the first window (610);
- providing, in a second window of the user interface (600), a point cloud (605) of a three-dimensional object of the facility, each location in the point cloud having point cloud coordinate data in three dimensions~~;~~, the piping line drawing (620) being displayed in the first window of the user interface (600) while displaying the point cloud (605) in the second window of the user interface (600), such that the piping line drawing (620) being displayed alongside of the point cloud (605);
- receiving, from the one or more users, selections of a third location and a fourth location on the point cloud (605) in the second window, the third location and fourth location defining a distance based on coordinate data in three dimensions for the third and fourth locations on the point cloud (605); ~~and~~
- in response to an instruction from the one or more users, applying the distance to the line on the

piping line drawing (620) in the first window (610);

- receiving an instruction from the one or more users to associate the first location on the piping line drawing (620) with the third location on the point cloud (605) and the second location on the piping line drawing (620) with the fourth location on the point cloud (605); and
- associating the first location with the third location and the second location with the fourth location,

wherein

- a first indicator is displayed on the first and the third location and
- a second, different indicator is displayed on the second and the fourth location."

XIV. The appellant's arguments relevant to the present decision may be summarised as follows.

All requests

(a) The problem-solution approach was not suitable for assessing inventive step in the case in hand as applying this approach did not duly consider the interaction between the individual features of claim 1 in all requests.

(b) Document D1 was not a suitable starting point for the assessment of inventive step of the claimed subject-matter for the following reasons.

(i) The core of the claimed subject-matter concerned a method for creating a piping line drawing for a facility. In that method, a piping line was first formed and

then its length was set using information from a point cloud. In contrast, in document D1, a complete piping line drawing was already present and just had to be corrected.

(ii) Document D1 described a computer aided design (CAD) program in which a drawn line comprised from the very beginning geometric information such as length and orientation. According to claim 1, a line did not comprise such geometric information from its inception. Such information was only provided in a second step, differentiating the entire process from CAD drawing tools in which a drawn line would from the very beginning be geometric in nature.

(c) The closest prior art was the prior art discussed in paragraph [0004] of the current application, not document D1.

Main request and auxiliary requests 1 and 2

(d) Document D1 did not disclose the feature of forming a piping line drawing if that feature was interpreted in the proper context provided by the other features of the claimed method.

(e) Document D1 did not disclose the feature of claim 1 reading: "*in response to an instruction from the one or more users, applying the distance to the line on the piping line drawing*". Document D1 showed neither that a piping line was actually changed as a result of a measured distance in a

point cloud, nor that this happened as a result of an instruction from a user.

(f) In document D1, distances between points on a point cloud were automatically measured, whereas according to claim 1, this measurement involved a user selecting two points on the point cloud. Therefore, the objective technical problem should be formulated as providing an alternative way to interact between the piping line drawing and the point cloud.

(g) Document D1 described an automatic mapping between points in a two-dimensional plan and their corresponding points in the point cloud from which a distance was determined. There was no reason to deviate from this automatic process and to do it manually.

Auxiliary request 3

(h) Document D3 did not disclose the feature that the point cloud was provided in a second window of the user interface. The right-hand side window on page 1 of document D3 showed a picture of a facility and not point cloud data.

Auxiliary request 4

(i) It was not obvious to set up two points on the point cloud between which a distance measurement was to be performed and in addition associate each of these two points on the point cloud with a corresponding start and end point on the piping line drawing.

Auxiliary request 5

(j) The feature of claim 1 reading "*a first indicator is displayed on the first and the third location and a second, different indicator is displayed on the second and the fourth location*" was technical. This feature enabled a simpler identification of corresponding points in a first window showing a two-dimensional piping line drawing and a second window showing a three-dimensional point cloud. The entire process of creating piping line drawings thus became more reliable and less prone to error. This feature enabled a user to manage the technical task of forming a correct technical drawing more efficiently and faster.

Reasons for the Decision

1. The appeal is admissible.

2. Applicability of the problem-solution approach to the case in hand

2.1 The appellant argued that the problem-solution approach was not suitable for assessing inventive step in the case in hand as applying this approach did not duly consider the interaction between the individual features of claim 1 in all requests (see point XIV.(a) above).

The temporal and logical interrelation of the following steps was not properly addressed:
(a) forming a piping line drawing
(b) measuring distances in a three-dimensional point cloud
(c) applying these distances to the piping line drawing

2.2 The board is not convinced by this argument as the interaction between the individual features of claim 1 in all requests is inherently considered when applying the problem-solution approach to the claims of the case in hand.

2.3 Hence, the board applied the problem-solution approach to all requests of the case in hand.

3. Main request - inventive step (Article 56 EPC)

3.1 Selection of the starting point for the assessment of inventive step

3.1.1 The appellant argued that document D1 was not a suitable starting point for the assessment of inventive step of the subject-matter of claim 1 of the main request. The core of the claimed subject-matter concerned a method for creating a piping line drawing for a facility. In that method, a piping line was first formed and then its length was set using information from a point cloud. In contrast, in document D1, a complete piping line drawing of a building was already present. The actual piping lines in the building were captured via a scanner, and a corresponding point cloud was created. Based on this point cloud, the already existing piping line drawing was corrected (see point XIV.(b)(i) above).

The board is not convinced by this argument because creating a piping line drawing encompasses modifying an existing piping line drawing, thus creating a new version of it.

3.1.2 The appellant argued that document D1 described a computer aided design (CAD) program in which a drawn line comprised from the very beginning geometric information such as length and orientation.

The appellant argued that claim 1 stated:

"*receiving from one or more users on a user interface, selections of a first location and second location, and forming a line on the piping line drawing between the first and second locations;*

receiving, from the one or more users, selections of a third location and a fourth location on the point cloud, the third location and fourth location defining a distance based on coordinate data in three dimensions for the third and fourth locations on the point cloud; and in response to an instruction from the one or more users, applying the distance to the line on the piping line drawing"

and thus the drawn line according to the claim did not comprise geometric information from its inception. Such information was only provided in a second step, differentiating the entire process from CAD drawing tools for which a drawn line would from the very beginning be geometric in nature. Therefore, document D1 describing the use of a CAD tool could not be the prior art closest to the claimed subject-matter (see point XIV.(b)(ii) above).

The board is not convinced by this argument for the following reasons.

Claim 1 specifies "*forming a line on the piping line drawing between the first and second locations*".

Claim 1 does not exclude that this line comprises geometric information from its inception. This geometric information may later be modified, as is commonplace in CAD programs in which editing takes place.

Hence, the board sees no reason why the piping line mentioned in claim 1 could not have been drawn with a CAD program.

3.1.3 The appellant submitted that not document Dl but the prior art discussed in paragraph [0004] of the current application was the closest prior art (see point XIV.(c) above). According to paragraph [0004] of the current application, personnel measured pipes by hand and drew blueprints according to the measurements.

The board finds that an important feature of claim 1 is the use of point clouds with coordinate data in three dimensions (see claim 1, lines 2 and 3). These point clouds are typically generated by 3D scanners (see Dl, pages 269 to 270, section "*APPLICATION OF 3D SCANNER ON CONSTRUCTION RECORD*"). Hence, the board is of the opinion that a suitable starting point for the assessment of inventive step of the claimed subject-matter should include the use of a 3D scanner and not a measurement of component dimensions by hand, as described in paragraph [0004] of the current application.

3.1.4 Furthermore, the board finds that document D1 is specific in that it discloses two-dimensional drawings of piping lines (see D1, Figure 5) with distances measured using three-dimensional point clouds (see D1, page 274, penultimate paragraph: "*plumbing point clouds can be made if as-built drawings do not display*

accurate locations, to measure distance point to point" and page 276, first paragraph: "*produces plumbing point clouds information with a 3D scanner and can help as-built drawings be drawn correctly*").

3.1.5 Therefore, the board finds that document D1 is a suitable starting point for the assessment of inventive step of the claimed subject-matter.

3.2 Disclosure of document D1

3.2.1 Document D1 discloses a method for creating a piping line drawing for a facility (see Figure 1: "*Correct shop drawings to as-build drawings*" and Figure 5: "*Correct shop drawings to as-build drawings, it is toilet of 10F, left is original drainage shop drawings, and right is as-built drawings after correct*") using distance data obtained from a point cloud (see page 274, penultimate paragraph: "*plumbing point clouds can be made if as-built drawings do not display accurate locations, to measure distance point to point*") with coordinate data in three dimensions (see Figure 2 and page 273, second paragraph: "*The point clouds of the on site scan is 1:1 scale of real spatial information, so it can use MicroStation TriForma and CloudWorx to maintain shop drawings*"), the method comprising:

providing a point cloud of a three-dimensional object of the facility, each location in the point cloud having point cloud coordinate data in three dimensions (see page 272, second paragraph, first sentence: "*By using the 3D scanner to record the plumbing point clouds and Cyclone to register them, one can clearly see three-dimensional point clouds*", Figure 1:

"*Registering Multi-scans, Load point clouds (.imp) from database*" and Figure 2)

forming a piping line drawing by
receiving, from one or more users on a user interface, selections of a first location and second location, and forming a line on the piping line drawing between the first and second locations (see Figure 1, upper left box: shop drawings from AutoCAD are generated by interactively designing lines; the same holds for Figure 1: lower right box: "*Correct shop drawings to as-built drawings*")

in response to an instruction from the one or more users, applying the distance to the line on the piping line drawing (see Figure 7: "*...parenthesis is measurement from point clouds*", page 274, penultimate paragraph: "*plumbing point clouds can be made if as-built drawings do not display accurate locations, to measure distance point to point*" and page 276, first paragraph: "*produces plumbing point clouds information with a 3D scanner and can help as-built drawings be drawn correctly*")

3.2.2 The appellant argued that in document D1, a piping line drawing, i.e. an original 2D shop drawing, may have been created, but this creation took place a long time before applying distance measurements using point clouds captured by a scanner. Hence, in document D1, a step of forming a piping line drawing had neither temporal nor logical association with the other steps in the claimed method. Therefore, document D1 did not disclose the feature of forming a piping line drawing if that feature was interpreted in the proper context provided by the other steps of the claimed method (see point XIV.(d) above).

The board is not convinced by this argument for two reasons.

Firstly, the claimed method does not specify any temporal distance between its steps. Hence, the feature "*forming a piping line drawing*" in claim 1 is anticipated by the creation of an original 2D shop drawing (see Figure 1, top-left box of the information flow: "*2D shop drawings (AutoCAD, .dwg) Drainage plan*").

Secondly, in document D1, a modified version of the piping line drawing is created (see Figure 1: middle right box of the information flow stating "*Correct shop drawings to as-built drawings*"). In that process, a user has to indicate which line is to be corrected, meaning that the start and end points of that line are selected and a modified line is drawn between these points (see Figure 5: "*Correct shop drawings to as-built drawings, it is toilet of 10F, left is original drainage shop drawings, and right is as-built drawings after correct which was not finished vent stack in scanning*"). At least this process of creating a corrected as-built drawing is in close relationship with the other steps of the claimed method, namely to provide a point cloud and to apply the distances measured in this point cloud.

3.2.3 The appellant argued that document D1 did not disclose the feature of claim 1 reading: "*in response to an instruction from the one or more users, applying the distance to the line on the piping line drawing*" (see point XIV.(e) above).

The appellant submitted that Figure 7 of document D1 showed different measurement results, but an actual piping line had not been changed. Furthermore, it could not be discerned from Figure 7 which elements were shown in an actual user interface created by a CAD program and which lines and labels had been added later by the authors of document D1 as mere explanations.

The board is not convinced by this argument because Figure 7 shows different distance measurement results attached to air ducts as labels. The fact alone that these labels contain distance measurement results means that the measured distances are applied to lines on the piping line drawing. Moreover, the disclosure in Figure 1, middle right box: "*Correct shop drawings to as-built drawings*" and on page 276, first paragraph: "*produces plumbing point clouds information with a 3D scanner and can help as-built drawings be drawn correctly*" makes it clear that as-built drawings containing piping lines are to be drawn correctly, i.e. that they are modified.

The appellant argued that "*applying the distance*" may occur but that document D1 did not disclose this to happen as a result of an instruction from one or more users.

The board is not convinced by this argument because it is evident from Figure 1 of document D1 that all actions in that information flow, including to "*[c]orrect shop drawings to as-built drawings*", are triggered by user actions.

3.3 The subject-matter of claim 1 therefore differs from the disclosure of document D1 in that the former further specifies:

receiving from the one or more users, selections of a third location and a fourth location on the point cloud, the third location and fourth location defining a distance based on coordinate data in three dimensions for the third and fourth locations on the point cloud

3.4 The technical effect of selecting two locations on a point cloud defining a distance based on the coordinate data of these locations in three dimensions is to measure a distance in a point cloud.

3.5 The objective technical problem to be solved may therefore be regarded as how to measure distances in point clouds.

3.5.1 The appellant argued that in document D1, distances between points on a point cloud were automatically measured, whereas according to claim 1, this measurement involved a user selecting two points on the point cloud.

The appellant submitted that therefore the objective technical problem should be formulated as providing an alternative way to interact between the piping line drawing and the point cloud (see point XIV.(f) above).

The board is not convinced that this formulation of the objective technical problem is correct because it covers any kind of interaction between the point cloud and the piping line drawing and is therefore too unspecific.

3.5.2 Hence, the objective technical problem remains the one formulated under point 3.5 above.

3.6 Obviousness

3.6.1 Document D1 discloses the use of the program "CloudWorx" to maintain shop drawings (see D1, page 273, second paragraph: "*use MicroStation TriForma and CloudWorx to maintain shop drawings*"). Hence, it would have been straightforward for the person skilled in the art to consider a document describing this CloudWorx software. Such a document is D3 (see D3, title).

3.6.2 Document D3 discloses measuring distances between two points on a point cloud based on their coordinate data in three dimensions (see page 2, box at the bottom: "*Measurement: 3D point coordinate, point-to-point*" and page 4, section "*Powerful Point Cloud Management & Measurement*").

By applying these features of document D3 to a method according to document D1 to obtain the measurements in parenthesis, the person skilled in the art would have arrived at the subject-matter of claim 1 in a straightforward manner.

3.6.3 The appellant argued that document D1 described an automatic mapping between points in a two-dimensional plan and their corresponding points in the point cloud from which a distance was determined. There was no reason to deviate from this automatic process and do it manually (see point XIV.(g) above).

The board is not convinced by this argument as it is a common requirement in technical systems to allow an operator to manually enter instructions that can override the automatic settings.

3.6.4 The appellant referred to document D1, page 273, second paragraph stating: "*If one used shop drawings and the naked eye to observe and measure on site pipe locations, the workload would be enormous. Since the location of pipes is difficult to measure, it will affect the data. In addition, it must measure the data of every side of the pipe, which is difficult*". The appellant argued that this passage of document D1 would have discouraged the person skilled in the art from applying manual settings.

The board is not convinced by this argument because this cited passage of document D1 refers to truly manual measurements of piping line dimensions, not to a manual selection of points in a point cloud. This is evident from the subsequent sentence in document D1, page 273, second paragraph reading "*[i]f it used point clouds, it can search data relating to any distance to a wall, slab, or another pipe*".

3.6.5 The appellant also argued that according to document D1, the point cloud data and the distances derived from it were considered accurate and used to correct the shop drawings. Hence, it was not obvious to deviate from an automatic measurement process.

The board is not convinced by this argument because errors can still occur in automatic measurements. For example, automatic measurements of two adjacent point pairs may yield very different results. This is a reason to enable a manually triggered measurement by setting specific start and end points in the point cloud.

3.7 In view of the above, the board finds that the subject-matter of claim 1 of the main request does not involve

an inventive step within the meaning of Article 56 EPC in view of documents D1 and D3 and the common general knowledge of the person skilled in the art.

4. Auxiliary request 1 - inventive step (Article 56 EPC)

4.1 Claim 1 of auxiliary request 1 differs from claim 1 of the main request in that the former further specifies that:

(a) a line on the piping line drawing is two-dimensional

(b) a distance between two locations on the point cloud is a distance in three dimensions

(c) the user selections of a third and a fourth location on the point cloud are received on the user interface

4.2 In the assessment of inventive step of claim 1 of the main request, the subject-matter of that claim had been understood in the same way as now explicitly specified by features (a) and (b) of point 4.1 above, see point 3.2.1. above referring to:

(a) Figure 5 showing a two-dimensional piping line drawing

(b) page 272, second paragraph, first sentence: "*By using the 3D scanner to record the plumbing point clouds and Cyclone to register them, one can clearly see three-dimensional point clouds*"

Concerning feature (c) of point 4.1 above, it is evident that all user selections are performed via the user interface shown in the figure on page 1 of document D3.

4.3 The appellant did not provide counter-arguments.

4.4 Therefore, the subject-matter of claim 1 of auxiliary request 1 lacks inventive step within the meaning of Article 56 EPC for the same reasons as those given for claim 1 of the main request (see section 3. above).

5. Auxiliary request 2 - inventive step (Article 56 EPC)

5.1 Apart from some reordering of features, claim 1 of auxiliary request 2 differs from claim 1 of auxiliary request 1 in that the former further specifies that the piping line drawing is formed in a first window of a user interface.

5.2 This additional feature is disclosed by the left-hand side window shown on page 1 of document D3.

5.3 The appellant did not provide counter-arguments.

5.4 Therefore, the subject-matter of claim 1 of auxiliary request 2 lacks inventive step within the meaning of Article 56 EPC for the same reasons as those given for claim 1 of auxiliary request 1 (see section 4. above).

6. Auxiliary request 3 - inventive step (Article 56 EPC)

6.1 Claim 1 of auxiliary request 3 differs from claim 1 of auxiliary request 2 in that the former further specifies that the point cloud is provided in a second window of the user interface.

6.2 This additional feature is disclosed on page 1 of document D3 showing a view of the CloudWorx software graphical user interface. This graphical user interface includes two windows shown alongside each other. The first window on the left-hand side is used as a drafting board for drawing lines and for showing a

piping line drawing. The second window on the right-hand side displays the three-dimensional point cloud.

6.3 The appellant argued that the right-hand side window on page 1 of document D3 showed a picture of a facility and not point cloud data (see point XIV.(h) above).

The board is not convinced by this argument because the right-hand side window on page 1 of document D3 contains two labels. The first label reads "*The TruSpace viewer includes background images for better visualization*". The second label reads "*The TruSpace viewer provides a clearer image of scanned data*". From these two labels, it is evident that the right-hand side window contains a background image of the facility and the scanned data, i.e. the three-dimensional point cloud data.

6.4 Therefore, the subject-matter of claim 1 of auxiliary request 3 lacks inventive step within the meaning of Article 56 EPC for the same reasons as those given for claim 1 of auxiliary request 2 (see section 5. above).

7. Auxiliary request 4 - inventive step (Article 56 EPC)

7.1 Claim 1 of auxiliary request 4 differs from claim 1 of auxiliary request 3 in that the former further specifies the following features:

- receiving an instruction from the one or more users to associate the first location on the piping line drawing with the third location on the point cloud and the second location on the piping line drawing with the fourth location on the point cloud

- associating the first location with the third location and the second location with the fourth location

7.2 The person skilled in the art would have understood that these additional features are inevitably needed to associate a manual measurement of distances in a point cloud with the correct line in a piping line drawing.

Therefore, these additional features are obvious for the same reasons as those mentioned above for the main request addressing whether there is motivation to replace an automatic distance measurement with a manual one (see points 3.6.3 to 3.6.5 above).

7.3 The appellant argued that these additional features were not obvious because according to claim 1, the user had already specified the third and the fourth location on the point cloud (see point XIV.(i) above).

The board is not convinced by this argument because to set up a manual measurement of distances on a point cloud, the two points on the point cloud between which the distance measurement is to be performed need to be defined first. Moreover, it needs to be defined to which line in the piping line the distance measurement should apply. To do this, the two points on the point cloud necessarily have to be associated with the start and end points of the piping line.

7.4 Therefore, the subject-matter of claim 1 of auxiliary request 4 lacks inventive step within the meaning of Article 56 EPC for the same reasons as those given for claim 1 of auxiliary request 3 (see section 6. above).

8. Auxiliary request 5 - inventive step (Article 56 EPC)

8.1 Claim 1 of auxiliary request 5 differs from claim 1 of auxiliary request 4 in that the former further specifies that:

(a) "the first window having a drafting board"

(b) "wherein the user interface includes a toolbar having tools
- for drawing lines on the first window (610) and
- for inserting components, at least fittings, into the piping line drawing (620) within the first window (610)"

(c) "the piping line drawing (620) being displayed in the first window of the user interface (600) while displaying the point cloud (605) in the second window of the user interface (600), such that the piping line drawing (620) being displayed alongside of the point cloud (605)"

(d) "a first indicator is displayed on the first and the third location and a second, different indicator is displayed on the second and the fourth location"

8.2 Page 1 of document D3 shows a view of the CloudWorx software graphical user interface. This graphical user interface includes two windows shown alongside each other. The first window on the left-hand side is used as a drafting board for drawing lines and for showing a piping line drawing. On the top-left side of this window, there is a toolbar for inserting components, at least fittings. The second window on the right-hand side displays the point cloud.

Hence, document D3 discloses features a) to c) quoted under point 8.1 above.

8.3 Concerning feature d) quoted under point 8.1 above, document D3 shows that start and end points of lines on a point cloud and in the drawing board are associated with each other (see page 1, the lines in the left-hand drawing board which correspond to points in the point cloud shown in the right-hand window and the annotation: "*Points picked in the TruSpace viewer can drive CAD commands to draw lines*").

The use of different identifiers for the start and end points of lines is a mere visualisation of data aimed exclusively at improving the way the information represented by the line is perceived or processed by the human mind. Hence, feature d) quoted under point 8.1 above is non-technical (see Case Law of the Boards of Appeal of the European Patent Office, 10th edition, 2022, ("Case Law"), I.D.9.2.10 a)) and thus cannot establish an inventive step.

8.4 The appellant argued that visually distinguishing indicators enabled a simpler identification of corresponding points in the two windows. The entire process of creating piping line drawings became thus more reliable and less prone to error (see point XIV.(j) above).

The board is not convinced by these arguments because a simpler identification of corresponding points of a single piping line in the two-dimensional window and the three-dimensional window is an effect that takes place only in the mind of a user. It has no technical implications for the image showing the drawing, such as reducing the required display area. Furthermore, the

claim does not specify any further steps which are enabled by the simpler identification and which might solve a technical problem.

8.5 The appellant argued that the visual appearance of certain elements, and in particular the way items are displayed in a computer program, could serve technical purposes. For example, a design might enable an operator to perform a technical task faster or more reliably. The claimed invention solved a technical problem (how to identify equivalent elements in two dissimilar and possibly mirrored or otherwise skewed representations) by technical means (by providing a different visual appearance for the two different end points). In line with points 16 and 17 of the Reasons of T 643/00, such design elements which enabled the user to manage a technical task more efficiently or faster were of a technical nature and should be evaluated for the presence of an inventive step (see point XIV.(j) above).

The board is not convinced that decision T 643/00 deals with a comparable situation. In decision T 643/00, the features at issue related to the resolution of images, i.e. their format, not to an element in the image, i.e. a part of the image information content, as in the current case.

8.6 The appellant argued that the claimed method of creating a technical drawing was technical. The claimed indicators helped a user to form a correct technical drawing. Creating a correct technical drawing was a technical task (see point XIV.(j) above).

The board is not convinced by these arguments because a feature assisting a user in carrying out a technical

task is not necessarily technical. In the current case, a simpler identification of lines in the two-dimensional and the three-dimensional views is just lowering the cognitive burden of a user, and this is not considered a technical effect (see Case Law, I.D.9.2.10 b) iii)).

8.7 In view of the above, the board finds that the subject-matter of claim 1 of auxiliary request 5 does not involve an inventive step for the same reasons as those set out for claim 1 of auxiliary request 4 (see section 7. above).

9. Conclusion

The main request and auxiliary requests 1 to 5 are not allowable because the subject-matter of claim 1 of each of these requests does not involve an inventive step within the meaning of Article 56 EPC. Since none of the appellant's requests is allowable, the appeal must be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chair:

K. Boelicke B. Willems

Decision electronically authenticated