Intellectual Property Office

BL O/026/16

19 January 2016

PATENTS ACT 1977

APPLICANT The Boeing Company

ISSUE Whether patent application GB 1109923.1 complies with sections 1(1)(b) and 14(3)

HEARING OFFICER C L Davies

DECISION

Introduction

1 Patent application number GB 1109923.1 ("the application") was filed by the Boeing Company ("the applicant") on 13 June 2011, claiming a priority date of 23 June 2010 from earlier United States patent application 12/821896. The application was published as GB 2481500 A on 28 December 2011.

2 Following earlier objection by the examiner that the claims of the application relate to no more than a computer program and a method for doing business *as such*, the application has already been the subject of an earlier Hearing decision, BL O/312/15, dated 6 July 2015. The outcome of this was that the Hearing Officer did not uphold the examiner's objections to patentability and so remitted the application back for further consideration of other matters, which had been deferred.

3 In his subsequent examination reports the examiner has argued that the claims lack an inventive step in view of two prior art documents, and common general knowledge, as exemplified by four further documents. He has also objected that the claims are insufficient due to excessive claim breadth, and in his most recent report, of 11 September 2015, he has also objected that the claims are 'classically' insufficient.

4 As the examiner and applicant have not been able to reach agreement on these matters, the applicant has been offered a further opportunity to be heard, but has instead requested that a decision be issued based on the papers on file.

5 I confirm that, in reaching my decision, I have considered all the correspondence on file.

The invention

6 The application is entitled “Fleet Performance Optimization Tool Enhancement”, and relates to the methods and systems for use in identifying what is termed a ‘rogue’ aircraft component to facilitate enhancing the performance of an aircraft system.

7 The description of the application explains that due to the volume of aircraft systems and components, monitoring each of them is a time-consuming task. The invention relates to a system for enhancing performance of an aircraft system made up of a number of components, which involves scanning a component in order to identify it, and maintain a history of data for the component. The historical data is used to determine an operating parameter uniquely related to that component, and comparing this operating parameter with a predefined baseline for components of that type. If the determined operating parameter deviates from the baseline by a particular amount, for example 50%, it is identified as a rogue component.

The claims

8 This decision is based upon the most recent set of claims filed on 10 August 2015 (‘the Main Request’). At the same date the applicant also filed a further set of claims (‘First Auxiliary Request’), which I will refer to later in my decision. The claims of the Main Request contain three independent claims: 1, 5 and 9. Since all three claims are very similar they will stand or fall together, I shall concentrate my decision on claim 1, which is set out below:

‘1. A method to discard a rogue component from an aircraft system that includes a plurality of components, said method comprising:

identifying a first component of the plurality of components; comprising scanning the first component for an identifier comprising a serialized part number, that uniquely identifies the first component to a history of data to be accumulated for the first component; and

maintaining the history of data by scanning the first component when it is removed from a first position, and rescanning the first component when it is replaced;

determining, using the history of data, an operating parameter that is uniquely related to the first component;

comparing the operating parameter to a predefined baseline for the first component wherein the baseline is not unique to the first component and is representative of a standard component of a same type as the first component; and

determining whether the first component is a rogue component dependent upon the history of data comprising determining a severity of deviation of the operating parameter from the baseline;

generating an alert, based on the determination, that indicates if the first component is a rogue component

presenting the alert, to a user of the system, indicative of the severity of the deviation;

presenting to the user a ranking of the first component with respect to the plurality of components based upon the severity of deviation; and

enabling the discarding of the rogue component when presenting the alert to the user indicates that the first component is a rogue component.'

Issues to be decided

9 The issues to be decided are whether the claims possess an inventive step as required by section 1(1)(b); and also whether the disclosure of the invention is clear enough and complete enough for it to be performed by a person skilled in the art, as required by section 14(3).

The law

10 The law regarding inventive step and sufficiency are set out in sections 1, 3 and 14 of the Patents Act 1977 ("the Act"), the relevant parts of which are set out below:

1.-(1) A patent may be granted only for an invention in respect of which the following conditions are satisfied, that is to say –

(a) ...

(b) it involves an inventive step;

(c) ...

and references in this Act to a patentable invention shall be construed accordingly.

.....

3. An invention shall be taken to involve an inventive step if it is not obvious to a person skilled in the art, having regard to any matter which forms part of the state of the art by virtue only of section 2(2) above (and disregarding section 2(3) above).

.....

14.-(1)...

(2)...

(3) The specification of an application shall disclose the invention in a manner which is clear enough and complete enough for the invention to be performed by a person skilled in the art.

.....

11 The standard test for determining inventive step is the structured approach found in Windsurfing International Inc. v Tabur Marine (Great Britain) Ltd, [1985] RPC 59 ('Windsurfing'), as reformulated by Jacob LJ in Pozzoli SPA v BDMO SA [2007] EWCA Civ 588 ('Pozzoli'; see paragraph 23 of the Court of Appeal's judgment). The four steps are:

(1)(a) Identify the notional “person skilled in the art”

(1)(b) Identify the relevant common general knowledge of that person;

(2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;

(3) Identify what, if any, differences exist between the matter cited as forming part of the “state of the art” and the inventive concept of the claim or the claim as construed;

(4) Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

Arguments and Analysis

12 In considering the matters in hand I shall first consider the issue of sufficiency, and then inventive step.

Sufficiency

13 The examiner has argued, in his examination reports of 22 July 2015 and 11 September 2015, that the application is insufficient for two reasons: excessive claim breadth, and also ‘classical insufficiency’, and has pointed to the relevant parts of the Manual of Patent Practice relating to sufficiency at paragraphs 14.61 to 14.82.

14 While not explicitly commented upon by either the examiner or the applicant with regard to sufficiency, I shall take the person skilled in the art to be the same as that for inventive step. In other words, and in agreement with the suggestion made by the examiner in his reports of 22 July 2015, and 11 September 2015, it is a team involved in scheduling maintenance for the replacement of parts of an aircraft, and including a specialist in parts maintenance scheduling, a statistical analyst, and a computer programmer.

15 As regards excessive claim breadth, the examiner has argued that the requirement of claim 1 of ‘determining, using the history of data, an operating parameter that is uniquely related to the first component’ is excessively broad, since the description provides only two clear examples of what might constitute such an operating parameter. In particular, paragraph [0028] of the application as-filed states that *‘Such operating parameters may include, but are not limited to, an average operating lifetime, a failure rate and/or a deviation from a baseline’*. The examiner has argued that the ‘deviation from a baseline’ is not a defined feature, which leaves only an ‘average operating lifetime’ and a ‘failure rate’, and that these two examples do not suggest the bounds of the group.

16 The applicant has responded that further examples are also listed at paragraph [0033] of the description, where it states that an icon (displayed by a presentation interface) *‘...is selectable to display a graphical representation of the health management data, such as, without limitation, a removal lifetime, an operating lifetime, an average removal lifetime, an average operating lifetime, a failure rate and/or deviation from a baseline’*.

17 Although I consider that paragraph [0033] only suggests one further example of an operating parameter that might be determined from a history of data, namely an average removal lifetime, I agree with the applicant that the claims are not insufficient due to excessive claim breadth. While this requirement of claim 1 is stated in general terms, I consider that it can reasonably be expected that the invention will work with anything falling within its scope, and it is not necessary, in my opinion, for the applicant to have disclosed all such terms.

18 With respect to 'classical insufficiency', the examiner has argued that the application is silent as to the what constitutes an *'average operating lifetime, a failure rate and/or a deviation from a baseline'* and how these parameters may be determined using the history of data. The applicant has responded that these terms should be given their normal meaning within the technical context of the application. Using the example of an average operating lifetime, and with reference to figure 4, the applicant states that it is *'...an average of a number of time periods during which a component has been "live".....The period during which the component is in use is an active lifetime period. An average operating lifetime for a component will be the addition of the periods during which the component has been active, divided by the number of periods'*. The applicant also points towards figure 4, which shows an example of 'health management data' for one particular component, and lists a number of separate entries for that component, including date entries that might be used in determining an average lifetime.

19 I am not persuaded that the claims are classically insufficient either. While the application does not detail explicitly how operating parameters, such as an average operating lifetime or failure rate, unique to a particular component are to be calculated from its historical data, I agree with the applicant's arguments that this would be straightforward to persons skilled in the art. The application does clearly disclose the unique identification of an individual component and maintaining historical data for that component. Furthermore, I think that it would be clear to the skilled person that determining an average value of a parameter, such as an average operating lifetime, or a failure rate, would inevitably involve the use of historical data.

20 To summarise, I find that the specification complies with section 14(3).

Inventive step

21 The examiner has also maintained that the claims are obvious in view of two prior art documents: **US 2009/312897 A1** (Jamrosz), and **WO 2008/151240 A1** (Accenture), both of which were published before the priority date of the present application. The examiner has also cited the following four documents, as exemplifying common general knowledge:

US 2007/2410908A1 (Coop)

US2007/241908 A1 (Wilbrink)

GB 2353124 A (Armstrong)

US 2007/200703 A1 (Baker)

22 I shall now follow the four steps of the *Windsurfing* test, as modified by *Pozzoli*, by considering each document in turn. In doing so it seems appropriate to consider steps (3) and (4) together.

Step 1(a): Identify the notional "person skilled in the art"

23 As I have noted above with regards to sufficiency, I accept the examiner's suggestion, in his examination report of 22 July 2015, that the person skilled in the art is a team involved in scheduling maintenance for the replacement of parts on an aircraft, which includes a specialist in parts maintenance scheduling, a statistical analyst and a computer programmer.

Step 1(b): Identify the relevant common general knowledge of that person

24 The examiner has argued that the common general knowledge of the team at the priority date would include knowledge relating to the tracking of parts using a unique identifier. In support of this, he has provided the following four documents:

(i) US 2007/241908 A1 (Coop), which discloses the use of RFID tags in managing maintenance data for aircraft components, involving associating an RFID tag with each of a plurality of aircraft components, and electronically displaying at least a section of an aircraft showing the location of the components with the tags.

(ii) US2007/094089 A1 (Wilbrink), which discloses the use of RFID tags to manage automotive parts, where the tags are affixed to parts of the vehicle (which may be an aircraft), and a data processing system provides information to an end user based on an installation or removal of a part from the vehicle.

(iii) GB 2353124 A (Armstrong), which discloses a method of maintaining a 'plant' (i.e. machinery) by marking components with a barcode, and identifying whether a component requires maintenance or replacement. It is stated that the plant may be an aircraft.

(iv) US 2007/200703 A1 (Baker), which discloses a process equipment tracking system, comprising attaching an RFID tag to a piece of equipment and storing data relating to that piece of equipment in a database.

25 The applicant has not commented on what would have formed the common general knowledge of the skilled person. While one needs to exercise caution in accepting individual prior art documents as exemplifying the common general knowledge, I am satisfied that the tracking of individual parts/components of a system using a unique identifier, such as by using barcodes and RFID tags, was very well known in many fields of technology at the priority date of this application. I also consider that it would have been well known in the art of aircraft maintenance to use unique identifiers such as RFID tags and/or barcodes to keep track of components, in conjunction with a database for storing associated identification data.

Step 2: Identify the inventive concept of the claim in question or if that cannot readily be done, construe it

26 The examiner, in his report of 11 September 2015, accepted the applicant's submission that the construction applied by the Hearing Office in the earlier hearing

decision on this application should be followed. While I largely agree, I think it is too broad for present purposes, as it omits some of the differences between the prior art and claim 1 noted during the rounds of correspondence between the examiner and the applicant. I think a reasonable identification of the inventive concept of claim 1 is as follows:

27 "A method for identifying and alerting a user to a rogue component in an aircraft system, thereby enabling it to be discarded, by determining an operating parameter from a history of data, the history of data being maintained for a first component by scanning a unique identifier for the component, and ; determining if the component is a rogue component based on the severity of deviation from a baseline, which baseline is not unique to the component but which is representative of standard components of the same type; and presenting to a user a ranking of components based on the severity of deviation."

Step 3: Identify what, if any, differences exist between the matter cited as forming part of the "state of the art" and the inventive concept of the claim or the claim as construed; and

Step 4: Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

US 2009/312897 A1 (Jamrosz)

28 This document relates to a method for performing aircraft maintenance on a fleet of aircraft by identifying events that affect aircraft availability. This involves collecting maintenance data from a plurality of aircraft, and processing the data using a computerised method to determine the availability of individual aircraft. Paragraphs [0115] and [0116] specify the use of serial numbers and the storage of installation and removal dates. Paragraph [0007] states that *'....a set of metrics relating to the aircraft availability for the plurality of aircraft is calculated from the processed data to form a set of calculated metrics'*, and *'A set of trends relating to the set of calculated metrics affecting availability of the plurality of aircraft is identified'*. Paragraph [0077] goes on to state that the metrics *'...may include, for example, aircraft mission capability and utilization, aircraft cycle time, awaiting parts, awaiting maintenance, turn-around times, repair and scrap rates, supply fill rate, cannibalization rates, no defect rate, total repair cost, mean flight hour between unscheduled maintenance action, mean flight hour between removal, mean flight hour between demand, and other suitable metrics'*. It seems to me to be appropriate to conclude that the metrics are analogous to the 'operating parameters' of claim 1 of the present application.

29 Paragraph [0093] explains, with reference to figure 9, that in one example aircraft parts are ranked according to a T-test value, to determine whether they are degrading. The method for determining the T-test value is set out in paragraphs [0142] to [0147], and involves partitioning the data for the chosen metric into data for the earliest two (out of three) months and data for the last month (out of three), to arrive at two average values, A1 and A2. A standard deviation, SD2, for the latest month's data is determined, as is a square root, SQ2, for the last month's data. The T-value, T_{val}, is calculated as:

T_{val} = (A2-A1)/(SD2 x SQ2)

30 In the example given, if the T-value is greater than a threshold value of 2.353, the part is identified as degrading. According to paragraph [0147], the value 2.353 is an example threshold value for the metric, and may vary depending on the confidence level, the amount of data being processed, or the degrees of freedom.

31 I agree with the examiner that two differences between this document and the inventive concept of claim 1 are that Jamrosz does not disclose (i) the scanning of components to determine a unique identifier, or (ii) the comparison of the determined operating parameter to a non-unique baseline.

32 However, I would also add to this that there is no disclosure of (iii) determining the deviation of the operation parameter from the non-unique baseline and (iv) ranking of components based on the severity of that deviation.

33 Turning now to whether these differences involve an inventive step, I agree with the examiner that difference (i), is obvious. As I have noted above, the use of unique identifiers for parts is disclosed in this document. It would be obvious to the team skilled in the art, using common general knowledge, that this could be achieved through the scanning of identification means, such as RFID tags or barcodes, and that historical data for each component could be maintained as a result of such a scanning step.

34 In my view, however, the other differences ((ii) to (iv)) I have identified above cannot be considered to be obvious from Jamrosz. The inventive concept of claim 1 of the present application requires ranking individual components according to the severity of deviation from a predefined baseline that is not unique for a given component, i.e. one that is standard for all components the same type. As is pointed out by the applicant in its agent's letter dated 6 October 2015, the 'modified' T-test disclosed in the Jamrosz document, on the other hand, necessarily involves determining the statistical variance in two sets of data unique to a specific component. The preferred example uses two sets of data taken from the previous three months of performance data. It is a very specific disclosure, and in my view, there is no general teaching in Jamrosz that might lead the skilled person to consider changing one of the sets of data for data relating to a non-unique baseline, such as data from a control group. Even if one of the sets of data used in the T-test were to be substituted by one relating to a non-unique baseline (such as control group data), there is no suggestion of determining a severity of deviation from that baseline in order to rank components. I think that to do so would go against the teaching of Jamrosz, which is to rank by T-value those components that meet a threshold T-value.

35 Furthermore, while Jamrosz mentions in passing other statistical techniques aside from a T-test (e.g. at paragraph [0133]), I do not think that any of differences (ii) to (iv) can be considered obvious from these either, without the use of hindsight.

36 I conclude that claim 1 is inventive over the disclosure of Jamrosz.

<u>WO 2008/151240 A1 (Accenture)</u>

37 This document is entitled 'Performance Based Logistics for Aerospace and Defense Programs', and relates to an automated system for forming and implementing a performance-based logistics (PBL) contract. This involves the collection of data relating to components of a product (such as those of an aircraft) subject to the PBL contract, and the use of a predictive maintenance plan.

38 Under the heading 'Predictive Maintenance', paragraph [0108] discloses that *'The component data 76 may comprise a component identifier and other affiliated information'*, and paragraph [0109] goes on to state that a predictive maintenance controller accepts the collected or observed performance data on the component, and performs a comparison against a reference performance data standard based upon a component. If the collected or observed performance data deviates by a material amount or significant amount from a reference performance data of the performance standard, then any affected component, assembly, system or sub-component is identified as suspect.

39 Comparing this to the inventive concept of claim 1, I am satisfied that it relates to a method of identifying and alerting a user to a rogue ('suspect') component in an aircraft system based on the severity of deviation of an operating parameter ('performance data') from a baseline.

40 The applicant has argued, in its agent's letter dated 6 October 2015, that Accenture does not disclose the use of a non-unique baseline for a component. I do not agree: paragraph [0109] is silent as to whether the performance standard is unique or otherwise, and I note that paragraph [0078] states that a longevity estimator of the predictive maintenance module is based upon 'supplier data', which in my view suggests it is based on (non-unique) data for a component type, rather than unique data for an individual component.

41 I consider that the differences between the disclosure Accenture and the inventive concept of claim 1 are that it does not disclose: (i) the scanning of components to determine a unique identifier; (ii) determining an operating parameter using a history of data maintained for each component, and (iii) ranking components based on their deviation from a baseline ('performance data standard').

42 Turning to difference (i) identified above, as with Jamrosz, I consider that it would be obvious to a team skilled in the art that the disclosure of Accenture could be implemented using means to scan unique identifiers for each component. Indeed, it could be argued that as much is envisaged at paragraph [0054] of this document, which states that product life cycle management for managing the entire lifecycle of a product assigns a component with an item unique identification (IUID) or Radio-frequency identification (RFID) using RFID tags or transponders. The use of such RFID tags would inherently involve scanning. Therefore, in as much as there is any difference in this regard between Accenture and the inventive concept of claim 1, it is not inventive.

43 Moving on to differences (ii) and (iii) identified above, Accenture discloses the use of 'longevity' as one possible way of predicting future maintenance. Paragraph [0077] discloses that a timer provides an elapsed duration with respect to a component installation date, and paragraph [0078] specifies the use of an estimator that makes use of supplier data for component longevity. However, while there is disclosure of

maintaining some data on each component (such as at paragraph [0108], which discloses that *'component data 76 may comprise a component identifier and other affiliated information, such as whether the particular component identifier complies with the performance standard'*), there is, in my view, no suggestion of maintaining (and accumulating) what might reasonably be deemed a history of data by scanning components, from which an operating parameter is determined, such as an average operating lifetime. Even if it would have been obvious to the skilled team, in carrying out the disclosure of Accenture, to accumulate historical data for each component, I do not think it would also be obvious to use that historical data in order to determine an operating parameter. It follows that there is no suggestion of ranking components based on the deviation of such an operating parameter from the reference data, and so I do not think this difference is obvious either.

44 Therefore, I conclude that claim 1 is inventive over the disclosure of Accenture also.

45 Having found that claim 1 is not obvious from either Jamrosz or Accenture, it follows that independent claims 5 and 9 are not obvious either, or the dependent claims. I also need not consider the inventiveness of the claims of the 'First Auxiliary Request'.

Conclusion

46 I conclude that the inventions defined by the claims of the Main Request are disclosed by the application in a manner that is clear enough and complete enough to be performed by a person skilled in the art, as required by section 14(3); and that they are not obvious from either of the prior art documents cited by the examiner, as required by section 1(1)(b).

47 I remit the application back to the examiner for grant.

Appeal

48 Any appeal must be lodged within 28 days after the date of this decision.

C L Davies

Deputy Director, acting for the Comptroller