Intellectual Property Office

BL O/283/18

10 May 2018

PATENTS ACT 1977

APPLICANT	Emerson Process Management Power and Water Solutions Inc
ISSUE	Whether GB 1302541.6 Complies with Section 1(2) of the Patents Act 1977
HEARING OFFICER	Mrs S E Chalmers

DECISION

Introduction

1 Patent Application GB 1302541.6 was filed on 13th February 2013 claiming a priority date of 13th February 2012 from an earlier US application. It was published as GB 2500976 on 9th October 2013. The compliance date on this application has been extended under rule 108(3) of the Patents Rules to 15 May 2018.

2 Despite several rounds of amendment and argument the applicant has been unable to convince the Examiner that the invention is patentable under Section 1(2). The applicant accepted the offer of a hearing to resolve the matter. This took place on 21st March 2018 and was attended by the applicant's attorney, Mr Russell Sessford of Forresters. The hearing was attended by Mr Nigel Hanley who assisted me and the Examiner, Dr Maurice Blount. Ms Sophie Cartmell and Dr Andrew Hughes also attended as observers.

3 Shortly before the hearing, the applicant filed skeleton arguments setting out a main request relating to the claims of the application currently on file (filed on 3 January 2018) and five auxiliary sets of claims (filed on 12 March 2018) to be considered (in that order) if the main set were found to be unallowable. I am grateful for the skeleton arguments presented before the hearing and for the list of decisions referred to at the hearing which I have taken full account of in reaching my decision.

Preliminary Issue - Auxiliary Claim Sets

4 Before the hearing, Mr Sessford was notified that I was not minded to consider five sets of auxiliary claims. Following the guidance in paragraph 18.63 of the Manual of Patent Practice, I was of the view that I was under no obligation to consider these claims. I reminded him that the purpose of the Hearing was to resolve the disagreement between the applicant and the examiner on the outstanding issues and was not a continuation of the examination process. I also observed that the

applicant had already had three opportunities to amend the application to comply with the Act and Rules in response to the examiner's objections. I was therefore of the view the consideration of six claim sets would not be an effective use of the Tribunal's time. I therefore asked him to nominate one set of auxiliary claims that I would consider at the hearing along with the set of claims currently on file.

5 Mr Sessford raised a number of points in relation to this issue and he made a further submission to the office on 19th March setting out his position. Following that submission I took the view that this should be dealt with as a preliminary issue at the Hearing.

6 His first observation that I had already made a decision in this regard and that the applicant had not had the chance to be heard. He pointed out that Section 101 of the Patents Act 1977 states:

> *"without prejudice to any rule of law, the comptroller shall give any party to a proceeding before him an opportunity of being heard before exercising adversely to that party any discretion vested in the comptroller by this Act or rules."*

7 I believe I can dispense with this initial point relatively quickly. In so far as I have made a decision by taking this issue as a preliminary point at the hearing, I consider that the applicant has been given the chance to be heard.

8 Mr Sessford went on to explain why they had filed the auxiliary claim sets and emphasised that they were keen to provide as much assistance as possible to the IPO in progressing the case forward. As he further explained, it was not unusual for representatives to informally discuss potential claims with an Examiner before filing a formal set in amendment. Furthermore, by filing a number of auxiliary claims it gave the Hearing Officer a number of options should they find an initial claim set unallowable. To their mind this was an efficient and effective use of the Tribunal's time.

9 He also asked for some discretion in the matter given that the Examiner had changed their mind about the allowability of the claims. This he claimed had led to some confusion over where the "line of allowability" was drawn in this case with regard to the issues under Section 1(2). The filing of auxiliary claims would therefore allow them to explore this issue and offer the Hearing Officer options at the hearing.

10 He pointed out that the Examiner had already considered the main request as well as the first, second and fifth set of auxiliary claims. The two remaining claim sets, were in his opinion, necessary given the examiner's "flip/flopping" in his view as to whether the claims were allowable. This "constantly changing landscape" presented by the office made it difficult to move the case forward. He also made the point that he was of the opinion that the Examiner had already indicated that the fifth claim set was allowable.

11 In a final strand of his argument, he referred me to the judgment in *Nokia GmbH v IPCom GmbH [2012] EWHC 225 (Pat).* In this case, the court considered four sets of claims and even then required further amendments to be made. He noted that these were post grant proceedings under section 75 and that the courts were not known for

their latitude in such matters. However, he submitted it was clear that if the court in that case were able to consider such a number of claim sets then so should I. However, he conceded that the court in paragraphs 43-44 of that judgment made clear that "*litigants should not regard this case as giving encouragement to a practice of advancing a cascading series of alternative amendments to a patent specification*".

12 Let me deal with the final point first. The proceedings in *Nokia v IPCom* were post-grant and I do not think it necessarily follows that they should apply to pre-grant proceedings. The court made clear, as Mr Sessford pointed out, that their judgments should not be taken to encourage the practice of filing auxiliary claim sets. I would add that later in paragraph 46 of that judgment the court made clear that:

> *"those who seek to defend or enforce the statutory monopolies conferred by a patent should be prepared to identify the concept which they contend is really inventive, and not present the court with a smorgasbord of alternative monopolies in which they has incrementally greater confidence. In the present case, for the exceptional reasons I have indicated, this has not given rise to such problems."*

13 It is also important to note that in section 75 proceedings, the patent proprietor is required to seek the permission of the court to file amendments in accordance with rule 63.10 of the Civil Procedure Rules 1998. The onus is placed on the proprietor to provide full particulars of the proposed amendments (and the grounds for them). The proposed amendments are advertised and they are then open to opposition. It is therefore clear to me that there are significant differences in handling amendments pre and post grant. Whilst Mr Sessford makes an eloquent case, I do not believe I should follow *Nokia* in allowing consideration of all of the auxiliary claim sets which was said to be "for exceptional reasons" but instead I shall heed the warning given by the court in relation to discouraging this practice.

14 This leads me to the second point raised by Mr Sessford concerning the role of the Examiner. In effect, does the Examiner changing his mind during the course of the life of the application count as an exceptional reason? It goes without saying that, in a perfect world, whilst the Examiner – or for that matter any official operating in an official capacity – would prefer to be consistent in the answers and opinions which they give, that is not always possible. Unfortunately, there are cases where this cannot be avoided and I think this is one of those. Ultimately, the role of the Examiner in handling a patent application is to apply the law as set out in the Patents Act 1977 and grant a valid patent should it be possible to do so. In exercising the judgment that is required it will, on occasion, be necessary to "change one's mind" when responding to the individual circumstances of a case.

15 This leads me to the final strand of argument, namely that I should consider the auxiliary sets of claims as it is a more efficient and effective use of the Tribunal's time. I am not convinced that this is the case. The issue with unexamined claim sets such as these is that it is not always clear if they are supported by the specification. Indeed in this instance no support has been indicated. There is therefore the risk that, if I were to allow such an unexamined claim set, further objections could emerge – such as added matter – which cast doubt on the validity of the claims and

result in refusal for non-compliance on other grounds. This seems to me to defeat the purpose of the Hearing which is to provide finality to the proceedings.

16 On balance, I decided that it would not be an efficient use of the Tribunal's time to consider all five auxiliary claim sets and I do not believe there is any onus on me to do so. However, after discussion with Mr Sessford at the hearing, I indicated that I was willing to consider two sets rather than the one set as stated beforehand. He consequently nominated the second and fifth auxiliary claim sets and that is what I will base my decision on.

The Invention

17 The invention claimed is a simulation system for simulating the flows between various nodes of a process network such as those used in power generation plants. As stated in the opening paragraph of the specification, it relates to "a system and method for efficiently solving pressure/flow parameters in real-time in a process network simulation system." Flow networks of the type being simulated may be represented as a series of connected nodes, wherein each node corresponds to an item of equipment such as a valve or a pipe junction. In order to simulate the network, a set of equations is developed to model the equipment and the equations are then solved to determine flow characteristics at the nodes. If the flow network transports mass (such as a gas, liquid or powder) then these characteristics are pressure and flow rate; if it distributes electricity, they are voltage and current.

18 According to the specification, previous approaches to solving for flow characteristics in a process network have adopted one of two approaches. The first approach, referred to in the application as a "sequential solving method", involves starting at the upstream nodes and solving for each node individually, moving sequentially in a downstream direction. This, it is said, has a disadvantage that if one wants to calculate a flow characteristic at a downstream node, one has to wait for the calculations at all of the nodes upstream of the node of interest to be completed. It may also give rise to flow discrepancies between the various process components, which discrepancies may subsequently need to be reconciled. The second approach, referred to as a "simultaneous solving method", involves all of the equations for the entire process network being solved simultaneously. This, it is said, requires a great deal of processor power and is vulnerable to failure as a result of singularities which may arise in certain situations. Consequently, in the applicant's view, neither approach is particularly suitable for running simulations in real-time.

19 The invention adopts an approach which is a hybrid of the two prior-art techniques, based upon the identification of two different types of node. A "junction node" is defined as a node where flows diverge or coincide, whilst the remaining nodes are called "non-junction nodes." The invention involves first using the simultaneous method to solve for the junction nodes and then using the sequential method to solve for the non-junction nodes.

The Claims

20 The current claims were filed on 3rd January 2018 and comprise four independent claims, namely claims 1, 16, 30 & 39. Claims 1 and 16 form a first pair of related

claims, claim 1 being directed to a simulation system and claim 16 to a method of simulating. They are concerned with simulating a process network through which mass flows and, hence, with determining values of pressure and flow at the nodes. Claims 30 and 39 form a second pair of related claims, also directed to a system and a method, but they are concerned with flow networks of any type, be they carrying mass or electricity, and so are concerned with determining values of first and second flow characteristics at each node. Mr Sessford put it to me that, for the purposes of assessing excluded matter, there was no distinction between the four independent claims and they should therefore stand or fall together. I agree.

21 Claim 1 presently reads as follows.

> *A simulation system for simulating the operation of a process network having a set of physical plant elements through which mass flows, the process network including a plurality of process nodes including a multiplicity of junction nodes and one or more non-junction nodes that form different sub-sets of the plurality of process nodes in the process network, the system comprising:*
>
> *a computer device including a processor and a computer readable memory;*
>
> *a definition of the process network stored on the computer readable memory, the definition of the process network including the plurality of process nodes associated with the process network at which pressures or flows are to be determined in a simulation, wherein two or more of the process nodes are the junction nodes at which flow within the process network converges or diverges, and one or more of the process nodes are the non-junction nodes associated with process elements within the process network; and*
>
> *a simulation routine stored on the computer readable memory that executes on the processor to determine the pressures and flows at each of the plurality of process nodes of the process network during each of a multiplicity of simulation cycles, the simulation routine including for each simulation cycle in the multiplicity of simulation cycles:*
>
> *a first routine stored on the computer readable memory that executes on the processor to solve a set of simultaneous equations expressing a pressure/flow relationship to determine the pressure at each of the two or more junction nodes without determining the pressure at each of the one or more non-junction nodes and to determine the flow within each of a set of flow paths between the two or more junction nodes during each of the multiplicity of simulation cycles: and*
>
> *a second routine stored on the computer readable memory that executes on the processor after the first routine to determine pressures at each of the one or more non-junction nodes based on the pressures at each of the two or more junction nodes determined in the first routine and the flows within the flow paths between the two or more junction nodes determined in the first routine during each of the multiplicity of simulation cycles.*

22 The second auxiliary claim set specifies an additional feature namely that the routines determine the pressures and flows based on process control conditions. Amended claim 1 states:

> *a simulation routine stored on the computer readable memory that executes on the processor to determine the pressures and flows at each of the plurality of process nodes of the process network during each of a multiplicity of simulation cycles,* ***the simulation routine determining the pressures and flows based at least in part on process conditions associated with the process network,*** *the simulation routine including for each simulation cycle in the multiplicity of simulation cycles.*

23 The fifth auxiliary claim set shares the same subject matter of the main claim with an additional feature that the process network is modified based on one or more pressures or flows as output by the simulation system. Amended claim 1 states:

> ***wherein operation of the process network is modified based on one or more of the pressures and flows as output by the simulation routine.***

The law

24 The section of the Act concerning inventions excluded from patentability is Section 1(2), which reads:

> "1(2) It is hereby declared that the following (among other things) are not inventions for the purposes of this Act, that is to say, anything which consists of –
>
> (a)...
>
> (b)...
>
> (c) a scheme, rule or method for performing a mental act, playing a game or doing business or **a program for a computer**;
>
> (d)...
>
> but the foregoing provision shall prevent anything from being treated as an invention for the purposes of this Act **only to the extent that a patent or application for a patent relates to that thing as such**."

25 In order to decide whether an invention relates to subject matter excluded by Section 1(2), the Court of Appeal has said that the issue must be decided by answering the question of whether the invention reveals a technical contribution to the state of the art. The Court of Appeal in *Aerotel/Macrossan*[1] set out the following four-step approach to help decide the issue:

> 1) Properly construe the claim;
>
> 2) Identify the actual (or alleged) contribution;
>
> 3) Ask whether it falls solely within the excluded subject matter;
>
> 4) Check whether the actual or alleged contribution is actually technical in nature.

26 The operation of the approach is explained at paragraphs 40-48 of the judgment. Paragraph 43 confirms that identification of the contribution is essentially a matter of determining what it is the inventor has really added to human knowledge, and involves looking at substance, not form. Paragraph 47 adds that a contribution which consists solely of excluded matter will not count as a technical contribution.

[1] Aerotel Ltd v Telco Holdings Ltd (and others) and Macrossan's Application [2006] EWCA Civ 1371

27 The case law on computer implemented inventions has been further elaborated in *AT&T/CVON*[2] which provided five helpful signposts to apply when considering whether a computer program makes a relevant technical contribution. In *HTC v Apple*[3], Lewison LJ reconsidered the fourth of these signposts and felt that it had been expressed too restrictively. The signposts are:

i) whether the claimed technical effect has a technical effect on a process which is carried on outside the computer;

ii) whether the claimed technical effect operates at the level of the architecture of the computer; that is to say whether the effect is produced irrespective of the data being processed or the applications being run;

iii) whether the claimed technical effect results in the computer being made to operate in a new way;

iv) whether the program make the computer a better computer in the sense of running more efficiently and effectively as a computer; and

v) whether the perceived problem is overcome by the claimed invention as opposed to merely being circumvented.

Application of the Aerotel approach

The main request

Step 1: Properly construe the claim

28 Mr Sessford argued that the claim is to a real process control system that comprises pipework, valves and a number of sensors amongst other things. It is the sort of system that would be used in a plant to transport gas, oil, paint or powder through a process. These are clearly technical and physical things and the engineer in charge has a desire to know how the plant is working and what the pressures and flow rates are at various points within it. He made the point that the plant being simulated could be a real plant or a virtual plant that existed only on a computer, for this had no bearing on the invention. Moreover, the claim recites a definition of the process network, which must include the physical plant elements. It also recites multiple simulation cycles: each of these corresponds to a time step in the simulation.

29 In my view, claim 1 is largely self-explanatory and does not present any significant difficulties of claim construction. However, I make one observation and it is in connection with the "definition of the process network." It is clear from the specification (such as at paragraph 107) that this definition includes the parameters of each piece of equipment in the network; however, in order for the simulation to work it would seem necessary for the definition to include also the initial conditions of pressure and flow within the network, which is not mentioned in the application.

---

[2] AT&T Knowledge Ventures LP and CVON Innovations Limited v Comptroller General of Patents [2009] EWHC 343

[3] HTC v Apple [2013] EWCA Civ 451

Since the point was not raised during examination of the application and was not explored at the hearing I shall proceed on the basis that the skilled reader would find the initial conditions to be implicit in the language of the claim.

Step 2: Identify the Contribution

30 What then is the contribution? Mr Sessford made the point that the aim of the invention is to overcome difficulties with calculating the flows through process control systems. In the past, these calculations would be done by either a set of simultaneous equations or a set of sequential equations. Putting the former into practice, as is set out in paragraph 75 of the specification, was "computationally expensive" and would be susceptible to "numerical inaccuracies in certain situations in which for example mathematical singularities arose". The system of the claims is said to be a hybrid simulation technique which uses both simultaneous and sequential equations and delivers the benefits of faster computation and reduced complexity. In practice, running the simulation allows the system to amend subroutines of the controllers within the physical system, allows an operator to manually change the plant or even allow modification of a virtual plant in the design phase.

31 In short, Mr Sessford identified the contribution as a more efficient and more accurate simulation of a physical process plant, which provides a better mechanism to determine information about the operation of the process plant.

32 In his examination report of 31 August 2017, the examiner identified the contribution as an improved method of solving for first and second flow characteristics within a simulated system so that simulation of the operation of a flow network in a plant may be conducted. The examiner's focus was thus on the method of solving as the contribution, within the context of a simulation of a flow network in a plant.

33 At the hearing I raised the question of where the data for the inputs came from. Mr Sessford did not believe this to be an issue and that it would make no difference to the contribution. In any case he argued that the data was inherently real as it reflected process conditions in the process plant. To support this he drew my attention to paragraph 74 of the description where the simulation system operates on all or parts of a plant and how the system can enable a "*user to perform different simulation and prediction activities with respect to the plant via a user interface application in the suite of support applications"*. He went on to say that the user interface allowed the user to input values and it would make no technical sense for those values to be irrational or made up.

34 The method of solving is a key aspect of the invention, but it is intrinsically bound with the identification of junction nodes and non-junction nodes, upon which it depends to separate the simultaneous part of the solving from the sequential part of the solving. The classifying of the nodes is part of the "definition of the process network" and not an aspect of the method of solving. I therefore agree with Mr Sessford to the extent that the contribution lies at the level of the simulation itself.

35 The output from the simulation is in the form of calculated values for pressure and flow at the nodes of the network. I do not agree with Mr Sessford that this constitutes "information about the operation of the process plant," for two reasons.

Firstly, the values are values calculated by the simulation: they are not measurements of the network itself and so do not relate directly to the process plant. Secondly, the values are just values of pressure and flow, that is to say they are data which in and of itself does not convey any information. Some processing of the data is required before any information can be established which could inform a decision, be it a decision of an automated control system or of a human operator.

36 I shall take the contribution to be "A simulation of a process network, the process network having junction nodes and non-junction nodes, in which values of flow characteristics are calculated by first solving simultaneously for the junction nodes and then solving sequentially for the non-junction nodes."

Step 3: Does the contribution falls solely with the excluded matter?

37 It is common ground that the invention is a computer-implemented one and that the contribution takes the form of a computer program. The question to be resolved is whether the contribution resides solely in a computer program or whether it has a technical nature which takes it outside of the exclusion of s.1(2)(c) of the Act. Mr Sessford also highlighted that the invention is performed using a processor and a computer readable memory to stress that the contribution cannot be a mental act because it is implemented on a computer, which I accept.

38 Mr Sessford placed considerable emphasis on the simulation being a measuring tool which provides values of pressure and flow at the nodes without requiring the use of sensors. The simulation, he said, can be used in measuring the performance of a real process network or as a way of testing a proposed process network which exists only on a computer. According to the skeleton argument, "the entire purpose and function of the simulation is to permit the characteristics of the process plant to be studied and evaluated."

39 Firstly, he directed to me to the decision of the EPO Board of Appeal in *Vicom*[4] which considered the difference between an excluded invention and a technical one. In *Symbian*[5], the High Court directed that the analysis in *Vicom* should "be followed unless there is a very strong reason not to do so" and this finding was endorsed by the Court of Appeal in *HTC.*[6]

40 Mr Sessford referred me to paragraphs 6 and 7 of the *Vicom* decision.

> *6. The Board, therefore, is of the opinion that even if the idea underlying an invention may be considered to reside in a mathematical method a claim directed to a technical process in which the method is used does not seek protection for the mathematical method as such.*
>
> *7. In contrast, a "method for digitally filtering data" remains an abstract notion not distinguished from a mathematical method so long as it is not specified what physical entity is represented by the data and forms the subject of the technical process, i.e. a process which is susceptible of industrial application."*

[4] *Vicom Systems Inc./Computer-related invention* [1987] OJ EPO 14.
[5] *Symbian Ltd's Application* [2009] RPC 1
[6] *HTC Europe Co. Ltd. v Apple Inc.* [2013] EWCA civ 451.

41 My attention was drawn to the judgments of the High Court in *Astron Clinica*[7] and *Halliburton Energy Services*,[8] to emphasise that it is the substance of the claim that matters and not its form, such that a computer program is not excluded if it provides a technical contribution. With regards to Halliburton, Mr Sessford explained that the task of engineering process networks was just as technical as the task of designing drill bits.

42 I was also directed to several decisions of the Comptroller[9]. The facts of these cases differ from the present case and although I have considered them carefully I did not find them of assistance in reaching a view on the present matter. In any case I am required to treat every case on a case by case basis. As Birss J made clear in the judgment in *Lantana*[10] at paragraph 17:

> *In his argument Mr Beresford conducted a thorough review of the numerous authorities on the issue of software patenting. I do not propose to engage with that review in this judgment. The general point being made suffered from the same problem as the argument about* ***IBM*** *T6/86 in that it was too broadly stated.* ***Simply because it is possible to construct a generalised category which includes both the claimed invention in this case and a previous decision in which a claim was held to be patentable, does not help. It shows that such things can be patentable in some cases but does not show that the invention in this case is patentable.***

43 I think it is useful at this point to explore the context of the contribution defined above. The simulation which forms the contribution necessarily has starting data, but the process by which it is provided with that data does not form part of the contribution. The simulation is executed on one or more processors and outputs data in the form of calculated flow characteristics. There is nothing in the contribution which deals with how that data might subsequently be processed and how the resulting information is used in the control of the process network. The contribution is therefore restricted to the processing of data within a computer.

44 In his submission, Mr Sessford referred me to paragraphs 6 and 7 of *Vicom* which I reproduced at paragraph 40 above. I agree that those paragraphs are helpful; however, in order to glean the correct guidance from them I consider it necessary to read them in the context of the preceding paragraph 5.

> *"5. There can be little doubt that any processing operation on an electric signal can be described in mathematical terms. The characteristic of a filter, for example, can be expressed in terms of a mathematical formula. A basic difference between a mathematical method and a technical process can be seen, however, in the fact that a mathematical method or a mathematical algorithm is carried out on numbers (whatever these numbers may represent) and provides a result also in numerical form, the mathematical method or algorithm being only an abstract concept prescribing how to operate on the numbers. No direct technical result is produced by*

---

[7] *Astron Clinica and other's Applications [2008] EWHC 85 (Pat), RPC 14*
[8] *Halliburton Energy Services Inc's Applications [2012] RPC 129*
[9] *Western Geco*, BL O/135/07; *Marathon Oil*, BL O/174/10; *Boeing* BL O/312/15; *the Landmark Graphics cases*, BL O/154/18, O/148/18, O/143/18, O/140/18, O/138/18 & O/112/18; *the Fisher-Rosemount cases*, BL O/148/07, O/150/07, O/238/08, O/438/12 & O/246/17; *Senergy*, BL O/057/15; and *General Electric*, BL O/018/12.
[10] *Lantana v Comptroller-General of Patents* [2013] EWHC 2673 (Pat)

the method as such. In contrast thereto, if a mathematical method is used in a technical process, that process is carried out on a physical entity (which may be a material object but equally an image stored as an electric signal) by some technical means implementing the method and provides as its result a certain change in that entity. The technical means might include a computer comprising suitable hardware or an appropriately programmed general purpose computer."

45 Although the decision in *Vicom* considered the mathematical method exclusion, the reasoning is directly applicable to the parallel question of whether a computer program has a technical nature. The simulation program at issue here certainly shares a characteristic with the mathematical method of *Vicom* in so much as it is an *"algorithm carried out on numbers… and provides a result also in numerical form."*

46 The question then arises as to whether the rules embodied in that computer program are *"only an abstract concept prescribing how to operate on the numbers."* The application makes clear, and it would anyway be manifestly apparent to the skilled addressee, that the rules of the simulation are based on well-established physical and mathematical principles; however, that in itself is not enough to resolve the question. I return to my previous point that the contribution does not encompass the processes of acquiring or of inputting data, or of any processing of the data generated by the simulation or any actions taken as a result of the simulation. Therefore, the simulation is an abstract concept prescribing how to operate on the numbers, because it has no interaction with anything tangible on which it may have a technical effect. This indicates that the contribution falls solely within the excluded subject matter of being a computer program as such.

47 I can test this finding by following through the *Vicom* reasoning to see if there is nevertheless a direct technical result produced by the simulation. Is the simulation *"carried out on a physical entity (which may be a material object but equally an image stored as an electric signal) by some technical means implementing the method and provides as its result a certain change in that entity"*?

48 The simulation is carried out by a computer, which certainly falls within the scope of *"some technical means implementing the method"*, but I need also to consider whether the simulation is carried out on a physical entity. The Board of Appeal recognised that the *"physical entity"* might be a virtual construct such as an image stored electronically; however, they still chose to use the term *"physical entity."* In my view their words reflect that, in order to be technical, a process would need to be carried out on an independent entity having some industrial application in its own right. I draw support for this conclusion from paragraph 7 of *Vicom* which equates a technical process with one which is susceptible of industrial application. To the extent that the present simulation is a process carried out *on* anything (as opposed to being *implemented* by a computer), it must be carried out on the definition of the process network. This definition is simply an abstract theoretical representation of the process network and is not susceptible of industrial application. It thus follows that the simulation is not carried out on a physical entity.

49 Should my conclusion that the simulation is not carried out on a physical entity be wrong, that does not conclude the matter, for the Board made a further stipulation that the process must provide *"as its result a certain change in that entity."* Interpreting these words in their proper context, I believe the Board were referring to

a change in the nature of the entity (for example, the difference between the raw image and the enhanced image of *Vicom*). Taking the entity as being the definition of the process network, the present simulation results in changes in the values of the flow characteristics. This is simply a change in the value of the numbers, whilst the particular flow characteristics, such as pressure and flow, represented by those numbers remain the same. Moreover, the overall nature of the definition of the process network remains the same in that it serves the same purpose and delivers the same functionality as it did before the simulation process was applied. Hence there is no change in the nature of the entity.

50 In summary, my findings with regards to applying the reasoning of *Vicom* to the contribution at hand (as defined in paragraph 36 above) are as follows.

a) The contribution is consistent with the Board's characterisation of a non-technical method because it involves the processing of numbers to provide a result in numerical form, the contribution being only an abstract concept prescribing how to operate on the numbers.

b) The contribution is inconsistent with the Board's characterisation of a technical method because it is not carried out on a physical entity and it does not result in a change in the nature of that entity.

c) Consequently the contribution does not have a technical nature.

Step 4: Is the contribution technical?

51 As a check of my conclusion, I shall assess the contribution against the five "signposts" for a technical contribution, as set out in *AT&T* and updated in *HTC.* I was referred to the first of the signposts by Mr Sessford during the hearing.

52 The first signpost is "Whether the claimed technical effect has a technical effect on a process which is carried on outside of the computer." As I explained above, the simulation does not interact with any process carried on outside of the computer and so cannot have a technical effect on such a process.

53 The second, third and fourth signposts all relate to effects on the operation of the computer itself, irrespective of the application being run on the computer. These are not relevant to the contribution at hand which is restricted to a specific application.

54 The fifth signpost is "Whether the perceived problem is overcome by the claimed invention as opposed to merely being circumvented." In connection with this final signpost, the Courts have made clear, not least in paragraph 35 of *Lantana*, that the problem to be overcome must be a technical one. The problem solved by the simulation at issue here is how to solve the equations which define the process network in a more efficient and effective manner. That is a mathematical problem, not a technical one.

The second and fifth auxiliary requests

55 The second auxiliary request involved an addition to the independent claims to the effect of "the simulation routine determining the pressures and flows based at least in part on the process conditions associated with the process network." As I have

already commented on in paragraph 29 above, this is no more than would be implicit to the skilled addressee considering the claims of the main request. It does not change the nature of the contribution and so does not affect my finding in respect of excluded matter.

56 The fifth auxiliary request added a clause to the end of the independent claims, "wherein operation of the process network is modified based on one or more of the pressures and flows as output by the simulation routine." This appears to be a generalisation of the clause which concluded original claim 1: "wherein at least one process control routine performed by a controller is modified according to one or more of the determined pressures and flows associated with the process network so as to modify operation of the process network." The new clause does not reflect that it is, specifically, a process control routine that is modified in order to modify operation of the process network. I could find no support in the application as filed for the new clause and Mr Sessford did not direct me to any relevant passages.

57 I am therefore of the opinion that an amendment based on the fifth auxiliary request is not allowable because it adds matter in contravention of section 76(2) of the Act. Even if I am wrong on this issue, it does not change the nature of the contribution and so does not affect my finding in respect of excluded matter. Specifically, whilst the control routine may be amended that does not amount to controlling the process network.

Saving amendments

58 I have considered the main claim and the second set and fifth set of auxiliary claims. In each case I have reached the conclusion that they are computer programs and therefore excluded under Section 1(2) of the Act.

59 I have also considered the specification and whether there is any saving amendment that can be made. I note that the claims as filed referred to a step of modifying controllers in the process network. I have reviewed the specification as a whole and can find no substantive support for this aspect of the claims.

Conclusion

60 I find the invention is excluded under section 1(2) of the Act because it relates to a program for a computer as such. I therefore refuse this application under Section 18(3).

Appeal

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

MRS S E CHALMERS

Deputy Director, acting for the Comptroller