



PATENTS ACT 1977

APPLICANT Fisher-Rosemount Systems, Inc.

ISSUE Whether patent application number
GB0817814.7 complies with section 1(2)

HEARING OFFICER H Jones

DECISION

Introduction

- 1 The patent application relates to a computer-implemented method of managing a process model repository for a process control system. It was filed on 29th September 2008 and claims an earlier priority date from US applications filed on 28th September 2007 and 26th September 2008. The application was published as GB2453262 on 1st April 2009.
- 2 A first examination report issued on 17th August 2011 had the effect of extending the period for putting the application in order to 17th August 2012; this period has since been extended to 17th October 2012 by way of an as-of-right extension to a prescribed time limit. In this first examination report, the examiner argued that the invention falls within the exceptions of mathematical method and computer program set out in section 1(2) and therefore is not patentable. The examiner was persuaded to drop an objection that the invention is a mental act in response to arguments from the applicant.
- 3 Despite a number of attempts to amend the application to overcome the section 1(2) objection, the applicant has been unable to convince the examiner otherwise and has requested a hearing to decide the matter. A hearing was held by video conference on 22nd October 2012 at which Mr Michael Jaeger of Withers & Rogers LLP attended as patent attorney for the applicant. A minor objection to the clarity of claim 1 was dropped by the examiner at the hearing. The issue I have to decide is whether the invention is excluded by section 1(2) as a computer program or a mathematical method.

The invention

- 4 The application relates to a method of managing, maintaining and storing process models associated with a control routine in a process control system. Process control systems typically include process controllers linked to field devices such as valves,

valve positioners and switches for performing certain functions in industrial processes such as chemical or petroleum manufacture. A process model is described as being a representation of the dynamic relationships between process inputs and outputs, and can be used in model-based techniques such as Model Predictive Control (MPC) to directly configure/generate the necessary control routine in a computer-control system. A process model can be “tuned” over time such that it better represents the process under control and the conditions of the system at a particular point in time. These “tuned” process models can be stored so that the control system can learn from previous experience, i.e. the control system can select from a list of process models the one most suited to the particular condition of the system. This is described as adaptive control. The application suggests that in a real-time system, the number of process models may grow without bounds, though the rate of growth will be process dependent. For example, for a fast-changing flow loop with response times of a few minutes, a new process model may be identified several times during a single day. On the other hand, there may be slow responding temperature loops where changes happen very rarely. The application goes on to suggest (see para. [0011]) that having too many process models available in memory can slow down the process of analysing which model is best suited to current conditions, while also recognising that there are physical constraints in the amount of memory available to store long lists of models.

5 The invention is concerned with managing the history list of process models so that the number of models in the list is reduced to a manageable amount. Process models are sorted in accordance with a combination of first and second priority criteria, where at least one of the first and second priority criteria comprises a measure of the quality of the model or a measure of its age. If the list of process models exceeds a particular number then models are removed from the list based on the degree of separation between the combination of first and second priority criteria and a point of reference or threshold - the way in which priority criteria are combined and the degree of separation is calculated involves some complex mathematics. The effect of this manipulation is that when the history list exceeds a particular number, it is sorted in a particular order and a certain number of older or lower quality process models at the bottom of the list are removed.

6 An amended set of claims was filed on 2nd July 2012 having a single independent claim as set out below:

1. A method of controlling a process, the method including:

managing a process model history having a plurality of process models of an entity within a process plant stored within a memory comprising the steps of:

organizing the plurality of process models according to a combination of a first priority criterion and a second priority criterion, wherein each process model is represented according to a combination of a value in connection with the first priority criterion and a value in connection with the second priority criterion, wherein at least one of the first and second priority criterion comprises one or more of the group consisting of: a measure of model quality and a measure of model age;

calculating a degree of separation between each of the organized process models and a point of reference common to each of the organized process

models, wherein the point of reference comprises a value in connection with the first priority criterion and a value in connection with the second priority criterion; and

removing a process model from the model history based on the degree of separation if, prior to removal, a total number of process models identified for the same control routine as the process model to be removed exceeds a predetermined threshold value for the total number of process models to be stored in the process model history for said control routine, thereby resulting in a modified process model history; and

implementing said control routine using a model selected from the modified process model history to control the process.

The law

7 The relevant provision in relation to excluded inventions 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) a discovery, scientific theory, or mathematical method;

(b) a literary, dramatic, musical or artistic work or any other aesthetic creation whatsoever;

(c) a scheme, rule or method for performing a mental act, playing a game or doing business or a program for a computer;

(d) the presentation of information;

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.

8 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 (cf *Symbian*¹, *Aerotel*²). The Court of Appeal in *Aerotel* set out the following four-step test to help decide the issue:

1) 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.

Arguments and analysis

9 The first step in *Aerotel* requires me to construe the meaning of the claims. In his skeleton argument submitted shortly before the hearing, Mr Jaeger makes the point that claim 1 is now directed to a method of controlling a technical process and that this should be borne in mind when identifying the contribution made by the invention. The examiner acknowledges that this amendment has limited the scope of the

¹ *Symbian Ltd. v Comptroller-General of Patents* [2008] EWCA Civ 1066

² *Aerotel Ltd v Telco Holdings Ltd and Macrossan's Application* [2006] EWCA Civ 1371

monopoly sought by the application but he does not believe that it alters the contribution made by the invention in any way. I will deal with this in detail under the next step of the *Aerotel* test. Otherwise, there is no particular difficulty in construing the meaning of the claims.

- 10 The second step in *Aerotel* is to identify the actual or alleged contribution made by the invention, and guidance on how to approach this is provided at para. 43 of the Court of Appeal's judgment:

"How do you assess the contribution? Mr Birss submits the test is workable - it is an exercise in judgment probably involving the problem to be solved, how the invention works, what its advantages are. What has the inventor really added to human knowledge perhaps sums up the exercise. The formulation involves looking at substance not form - which is surely what the legislator intended."

- 11 The invention is concerned with reducing the number of process models in a history list stored within a computer and achieves this by organising the list in a particular order and removing the ones towards the bottom of the list. The inventor has sought to limit the number of process models available in the history list because of the effect it has on the speed of selecting the best model suited to current conditions and the amount of memory needed to store them all. The greater the number of process models stored, the longer it takes to identify the best model for controlling the process under particular conditions and the bigger the physical memory needed to store them. Approached from the point of view of the problem to be solved and of what the advantages of the invention are, I think that the contribution made by the invention can clearly be set in the context of an improvement in a method of controlling a process if less time is needed to identify the process model best suited for controlling the process.
- 12 The examiner has approached the assessment of contribution from the point of view of what has the inventor really added to human knowledge, and concludes that since the process is not controlled in any different way than before then the contribution has to be found in the way in which the list of models is organised and in the way in which models are removed from it. I think this assessment is incorrect, because it fails to recognise the final step in claim 1 of controlling the process according to a model from the modified list. The invention is not only concerned with modifying a list for the sake of modifying a list but also in using the modified list to control the process. It is this final step that allows the invention to solve the problems set out above and to realise the advantages described, i.e. it takes less time to select the model best suited to control the process in particular conditions.
- 13 I think Mr Jaeger is right to say that the way in which claim 1 is currently presented does make a material difference to the assessment of contribution. I also agree with his own assessment of the contribution as set out in his skeleton argument, namely a better method of controlling an industrial process by using one of a number of process models from a modified list. Having identified the contribution as an improved method of controlling an industrial process, it is clear to me that this does not fall solely within any of the categories of invention excluded by section 1(2) and that it is technical in nature.

- 14 I feel that I should add that had the application been silent about the complexity involved in selecting a suitable process model from a long list and using it to control a process, then this would have inevitably changed my assessment of the contribution and quite possibly my view of whether the invention was excluded under section 1(2). For example, if the only advantage in modifying the list of process models was in reducing the amount of memory occupied by the list, I think it would be difficult to say that the contribution extended beyond the computer and into a better method of controlling a process.

Conclusion

- 15 I find that the invention defined by claim 1 of the application does not relate to a mathematical method or a program for a computer as such and so is not excluded from patentability under section 1(2) of the Act. Claims 2-19 are dependent on claim 1 and are similarly allowable. As a consequence, I am returning the application to the examiner in order for him to send the application forward to grant.

H Jones

Deputy Director acting for the Comptroller